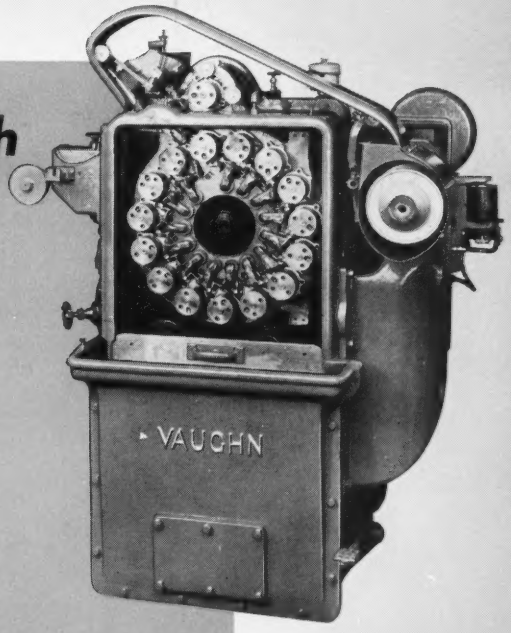
MARCH 1950

WIRE AND WIRE PRODUCTS

FROM ROD TO *FINE* WIRE



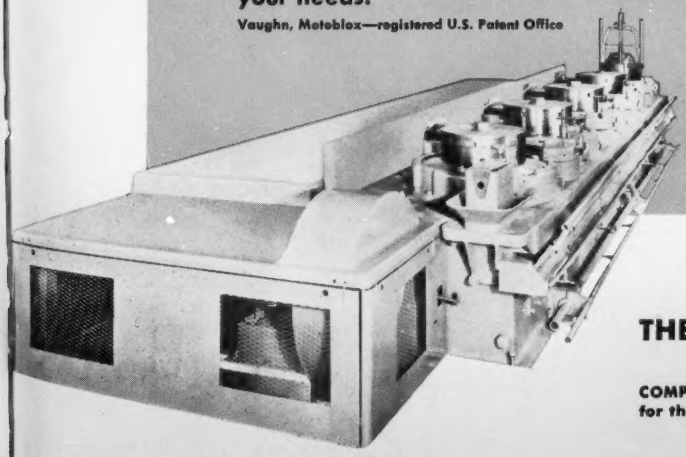
···Better Production with

VAUGHN

WIRE DRAWING MACHINERY

The complete range of wire sizes handled by Vaughn Motoblox and Wet Wire Machines . . . at high, safe speeds, month in and month out . . . enables prompt response to every market demand. Let us discuss the types and sizes meeting your needs!

Vaughn, Motoblox—registered U.S. Patent Office



"Quick on the Draw!"

VAUGHN MACHINERY

PROFITABLY USED BY LEADING WIRE MILLS SINCE 1871

V

THE VAUGHN MACHINERY COMPANY

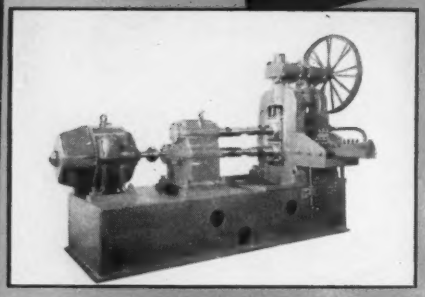
CUYAHOGA FALLS, OHIO, U. S. A.

COMPLETE COLD DRAWING EQUIPMENT—Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

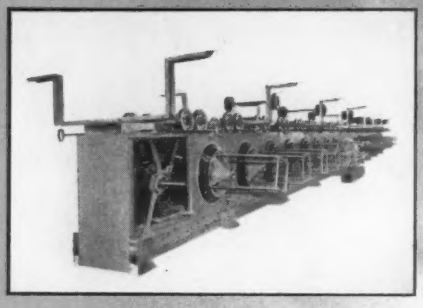
OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

LOOK TO Wean FOR WIRE MACHINERY

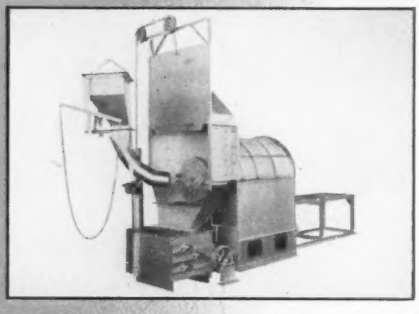
Process OR Product



2—Hi Wire Flattening Mill



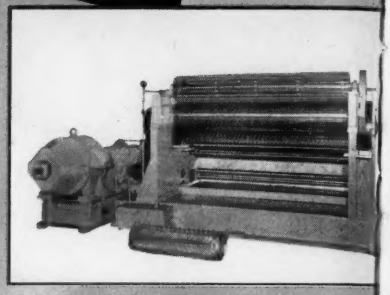
Wire Galvanizing Take-Up Frame



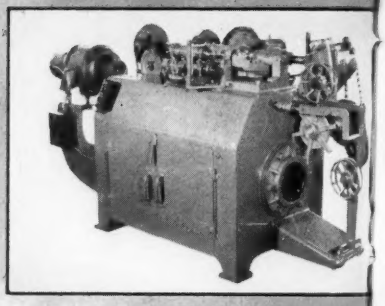
Nail Galvanizing Unit

In the past few years tremendous progress has been experienced in the field of wire machinery. Production speeds have been tripled and quadrupled. Product quality has been greatly improved. Machines have been made easier to operate and maintain.

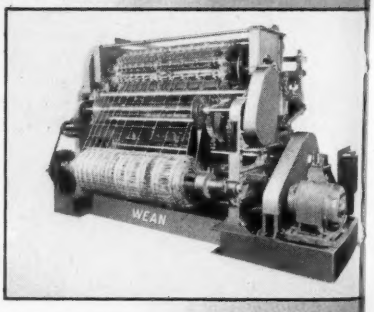
The Wean Equipment Corporation has been a large contributor to this advancement. Wean wire mill specialists have designed, built, and installed wire mill equipment for the leading wire producers the world over. If you make wire you should look to Wean for the best in machinery, service, and facilities.



Hexagon Netting Machine



2 or 4—Point Barbed Wire Machine



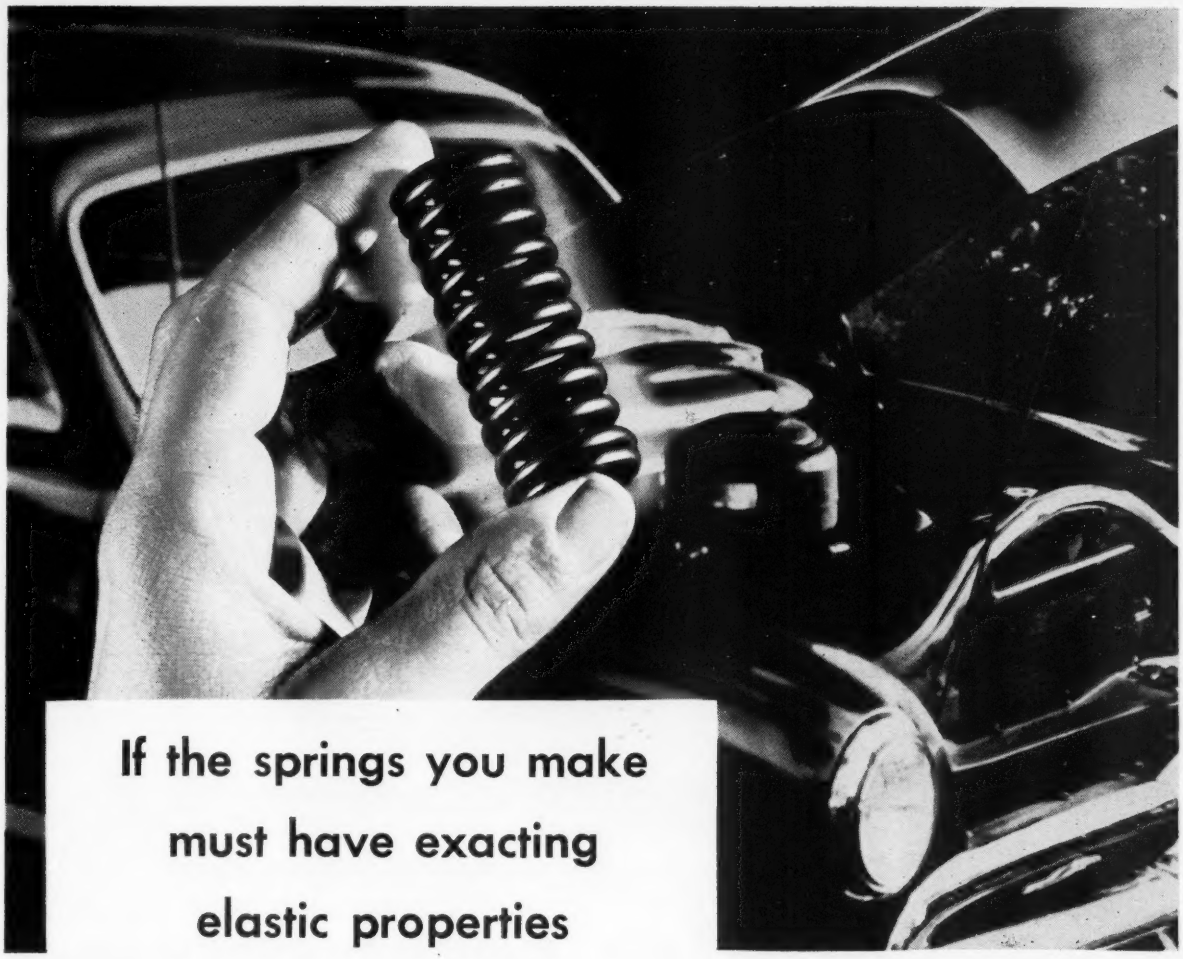
Hinge — Joint Fence Machine

NARROW STRIP MACHINERY

(FOR 36" WIDTHS OR NARROWER)

Wean Equipment Corporation

CLEVELAND, OHIO



If the springs you make must have exacting elastic properties

make them of Amertemp Wire!

SPRINGS headed for a service life that calls for exacting elastic properties? They'll live up to expectations if they're made of U·S·S Amertemp Wire—a high-quality oil tempered wire.

Also for applications where performance will be under high stresses . . . or in places where springs must have the ability to withstand deformation—you'll find Amertemp ideal.

Amertemp is carefully produced under a process which gives it truly outstanding quality . . . exceptional uniformity in gauge and grain structure.

As the world's largest manufacturers of oil tempered wire, we feel qualified to answer any questions you might have on your use of Amertemp. The services of our engineers are freely at your disposal.

And remember—we can supply Amertemp NOW—in mill quantities.

If you use oil tempered wire use— U·S·S Amertemp!

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
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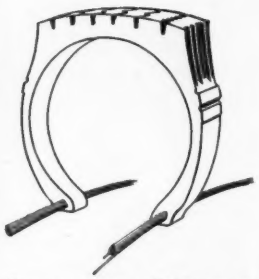
UNITED STATES STEEL



Two wire circles, called beads, are embedded in the tire at its inside diameters, helping to hold the tire on its rim and giving it the capacity to absorb shocks and stresses. Grouped together in a tape, the rubber-coated wires are firmly molded to the tire body.

Steel Wire for safer driving

Thin wires of steel add a lot of ruggedness to a pneumatic tire, making driving safer. The modern tire for passenger cars has as much as 200 ft of strong steel wire anchored in its foundations. Tires for trucks and heavy vehicles have much more.

Much of the tire-bead wire going into tires today originates in Bethlehem wire mills. A high-carbon, high-tensile wire, it is processed to meet exacting limits of quality and uniformity. Heat-treating and surface finish both receive particular attention. Tire-bead wire must have just the right toughness after its reduction by drawing, and good adhesive characteristics on the surface are essential for molding into the tire.

Whether you need one of our specialty wires or a more common grade, you can count on our careful observance of those important details that result in the best quality wire for each application. One of our engineers will gladly contribute his experience to any problems you may have in selecting and processing steel wire.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation.

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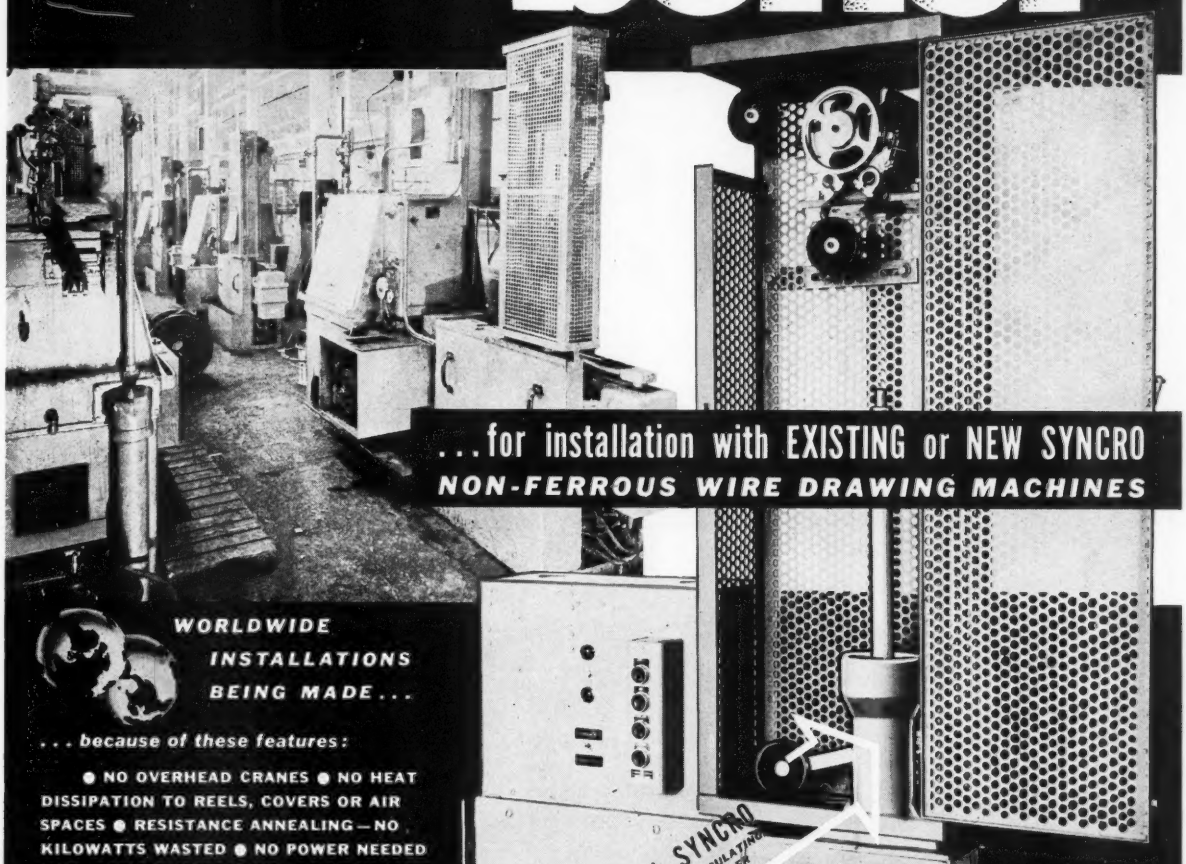
BETHLEHEM WIRE ★ BETHLEHEM STEEL ★

WIRE & WIRE PRODUCTS, Vol. 25, No. 3, March, 1950. Publication Office, at One Sherman Ave., Jersey City 7, N. J. Executive Office, 300 Main Street, Stamford, Conn. Published monthly by the Quinn-Brown Publishing Corp., Richard E. Brown, President; R. S. Spengel, Secy. and Treas. Subscription price: U. S. $5.00; Canada, $5.00 per year; 50 cents per copy; Foreign, $7.50 per year. Entered as second class matter, January 10, 1949, at the Post Office, Jersey City, N. J., under Act of March 3, 1879.

so much better



. . . for installation with EXISTING or NEW SYNCRO
NON-FERROUS WIRE DRAWING MACHINES

WORLDWIDE INSTALLATIONS BEING MADE . . .

. . . because of these features:

● NO OVERHEAD CRANES ● NO HEAT DISSIPATION TO REELS, COVERS OR AIR SPACES ● RESISTANCE ANNEALING—NO KILOWATTS WASTED ● NO POWER NEEDED FOR LOADING, UNLOADING, OR CONVEYING ● NO TIME LAG—HANDLES 5,000 FEET PER MINUTE ● CONTROLLED ELONGATION ● TAKES ALL STANDARD SIZES ● VISIBLE OPERATION ● PRODUCES CLEAN AND BRIGHT ANNEALED WIRE ● DESPOOLS PERFECTLY ● NO DISCOLORATION OR STICKINESS ● TAKES STANDARD METAL SPOOLS OR REELS ● TRANSFORMER CONTROL—TAPS COVER FULL SIZE RANGE ● ACTUAL ANNEALING COST ONLY IN CURRENT USED ● LABOR SAVING—NO REHANDLING ● SAVES FLOOR SPACE AND INVESTMENT COST ● COOLING WATER CONTINUOUSLY RECIRCULATED—TUBE LEVEL AT FIXED HEIGHTS ● PROPER GROUNDING INSURES OPERATING PERSONNEL SAFETY

EXCLUSIVE with SYNCRO
PATENTED STEAM SEALED, RECIRCULATING CONSTANT LEVEL ANNEALING CHAMBER

SYNCRO CONTINUOUS ANNEALERS

SEND US YOUR PROBLEMS
WE HAVE THE ANSWER

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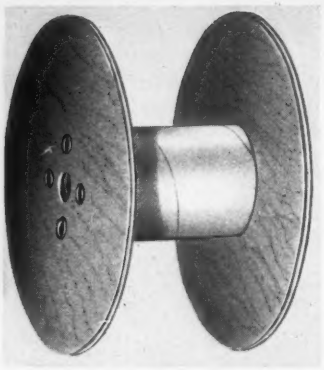
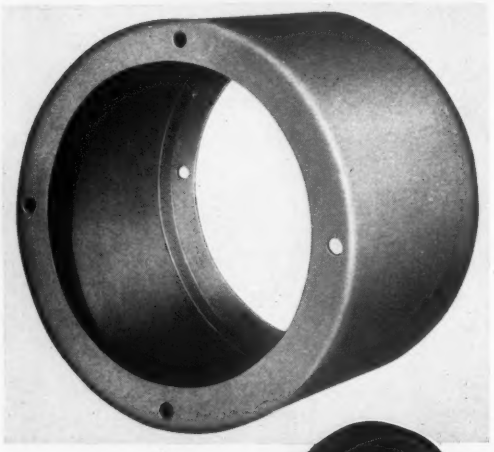
AFFILIATED COMPANY • WINGET-SYNCRO, ROCHESTER, KENT, ENGLAND





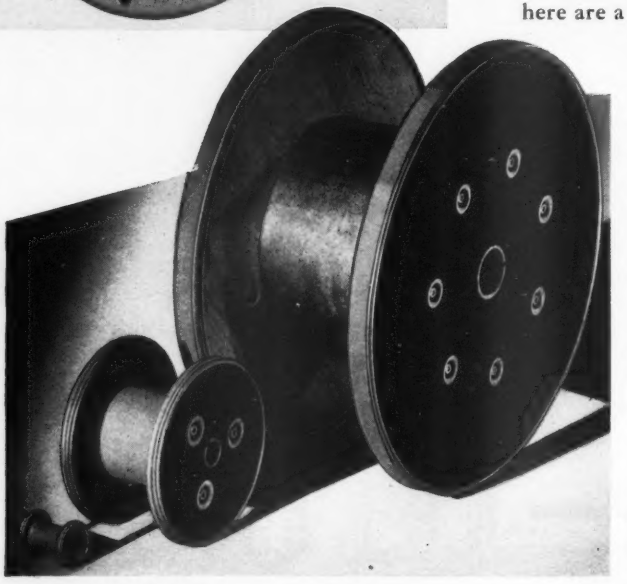
HUBBARD

Spools and Reels

BETTER PERFORMANCE

The exact balance of Hubbard spools and reels assures freedom from wire breakage at the new high speeds . . . and the other Hubbard qualities of rugged construction, minimum weight and low cost add up to highest overall spool performance in the wire industry.

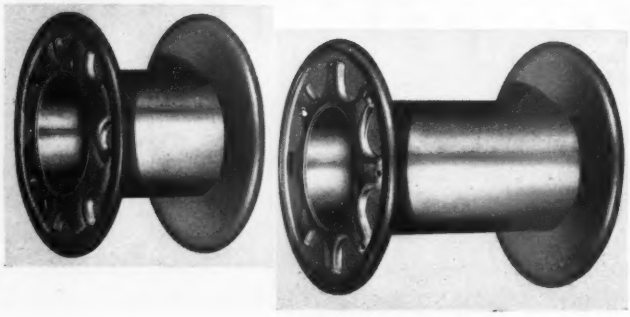
There is a size and type for every wire mill need. Shown here are a few of the many:



1. Lightweight Reels. Ideal (no return) for shipping many types of wire.
2. Steel Double-Strength Traverse. New in 1948. Double thickness flange and shoulder gives minimum weight with maximum strength where needed.
3. Metal Bound Spools and Reels for Shipping. Head of bonded plywood with die formed steel tire. For light weight and long wear.
4. Steel Process Spools. New in 1948. Steel washer design for greatest rigidity. All joints brazed and smooth finished. For all wire drawing and processing operations . . . especially recommended for handling fine wire. Built in all standard sizes.

For information on Hubbard spools, reels and traverses, write

HUBBARD SPOOL COMPANY
1624 Carroll Avenue • Chicago 12, Illinois



Hubbard

STEEL SPOOLS AND REELS . . . METAL BOUND SPOOLS AND REELS . . . STEEL TRAVERSES LIGHT WEIGHT REELS . . . WOOD REELS

R-166

- Improved round die design for wire, bar and tubing
- Improved forged steel casings for greater strength and tighter grip on nibs
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Call **Firth-Sterling**

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Offices and warehouses in Hartford, Philadelphia, Cleveland, Detroit, Chicago, Dayton and Los Angeles. Offices in New York and Pittsburgh.
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LOWER DIE COST ! ! !

We now offer semi-finished Carbide Dies at rough-drilled die prices as follows:

Properly encased premium grades of Carbide.

Concentricity assured as bearing and all angles are lapped to within .001" to .002" of the finished die specifications.

Eliminate costly ripping and loss of hole sizes to reduce your own die shop burden, thus permitting better care and maintenance of your dies.

Lower your inventory to a useful range of hole sizes.

You can now purchase EXACTLY what you need in grade, shape and size.

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Complete Carbide Sales and Service

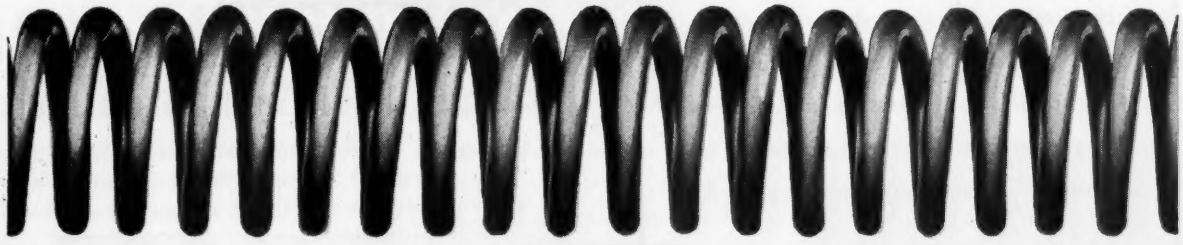
Today it's Roebling!

for Oil-Tempered Spring Wire... and production records tell why!

A MANUFACTURER'S own tests are absolutely necessary. But how his product performs in plants all over the country is the real proof of the pudding! And it's a matter of record that Roebling Oil-Tempered Spring Wire brings users fewer machine stoppages, and cuts down rejects.

Roebling has one of the largest specialty wire mills in America. From steel-making to finished wire, Roebling techniques and the most modern precision machines ever built assure a product that is always uniform in mechanical and metallurgical properties . . . that saves you preparation time and brings faster, smoother operation!

Have your Roebling Field Man help you choose the Oil-Tempered Spring Wire—or other round, flat or shaped wire—that will be best for your product and your production. John A. Roebling's Sons Company, Trenton 2, New Jersey.



Roebling makes a wide range of Round and Shaped Wires in various grades of steel. Some are also available in other metals, including copper and copper alloys.

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A CENTURY OF CONFIDENCE

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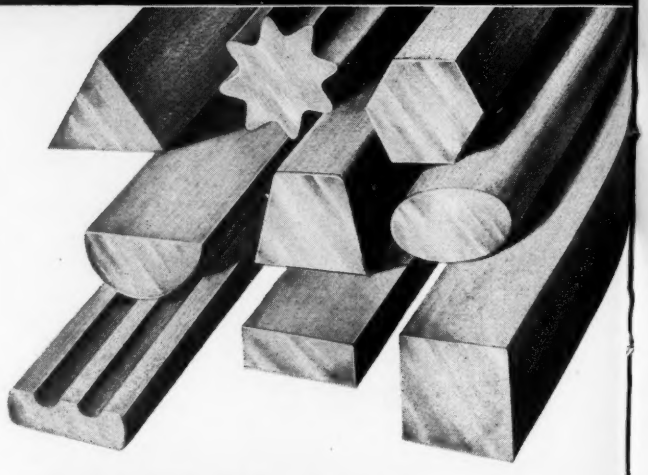
Choice of Experience...

PRODUCT-PROVED WIRE

CONTINENTAL STEEL CORP. STEEL CONTINENTAL REG. U.S. PAT. OFF. WIRE KOKOMO, IND.

Hundreds of leading manufacturers demonstrate a strong "repeat" preference for Continental wire. Their own products have proved the worth of this wire. Their own experience has convinced them that Continental has the wire that wins customer friends. Whether your need is for a rust-resistant wire that can stand up under difficult forming operations . . . or for a shaped wire to provide smarter-looking, longer-lasting trim—whatever the nature of your own product—Continental wire can help you build a better, more profitable product. Continental wire is uniform in temper, uniform in coating. It is made to fit specific manufacturing and fabricating requirements. Write Continental at Kokomo. Tell us about your wire needs.



CONTINENTAL WIRE

Shaped to Fit Your Special Needs

Continental special shaped wire has product-proved "sales appeal." It is helping boost the market appeal of many products. The things you make may have one or more parts which can be "shape-engineered" from wire to do a better job . . . with added profit for you. Continental's handy booklet of helpful wire information will be sent you free on request.

CONTINENTAL STEEL

CONTINENTAL STEEL CORPORATION

GENERAL OFFICES • KOKOMO, INDIANA

PRODUCERS OF *Manufacturer's Wire* in many sizes, KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, ALSO, Coated and Uncoated Steel Sheets, Nails,

●STANDARD LUBRICANTS do more than their share to speed up production!

●STANDARD LUBRICANTS take a big slice out of our operating costs!

●STANDAND LUBRICANTS give us better wire finish every time!

●STANDARD LUBRICANTS and service engineers are a sure cure for wire drawing "headaches"!

●STANDARD LUBRICANTS insure maximum die life!

●STANDARD LUBRICANTS are always dependable, always give us top performance!

6 Good Reasons Why Wire Producers Specify Standard Lubricants

No matter how they part their hair, or where, leading wire producers depend on Standard Lubricants for faster, better wire drawing! Mill-tested for top performance, these special-purpose compounds are developed by experienced technicians to save you time, trouble, money!

If you're looking for high speed production, low operating costs and better wire finish, we think you'll find what you're looking for in the formulas perfected by Standard!

There's a Standard service engineer ready to work with you on any lubrication problem you may have. He's a mighty good man to know when the going gets rough. Next time you need help — or better wire drawing compounds — just call for Standard!

Standard's wire drawing compounds will produce the finish you require on all grades of steel, copper, or brass: — lime bright, extra bright, dull-coated; or special finishes for welding, lacquering, enamelling or plating.

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STANDARD INDUSTRIAL COMPOUNDS COMPANY
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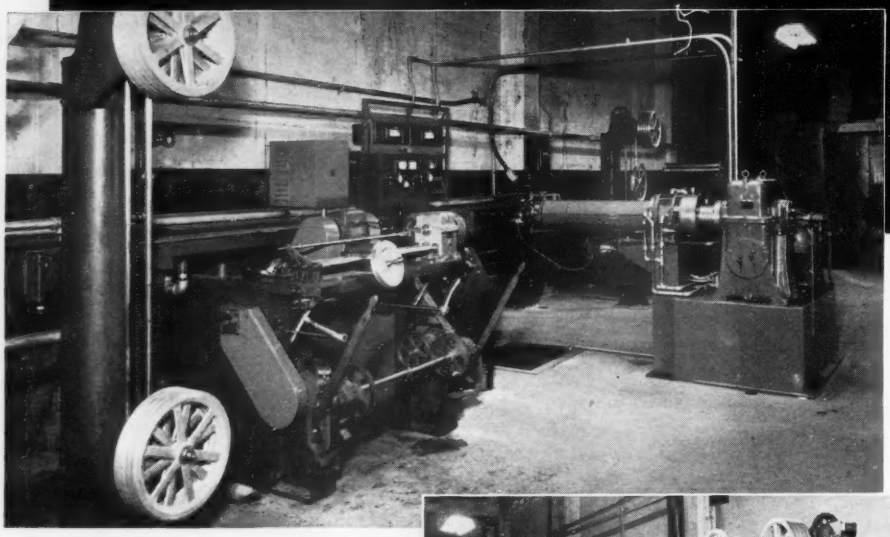
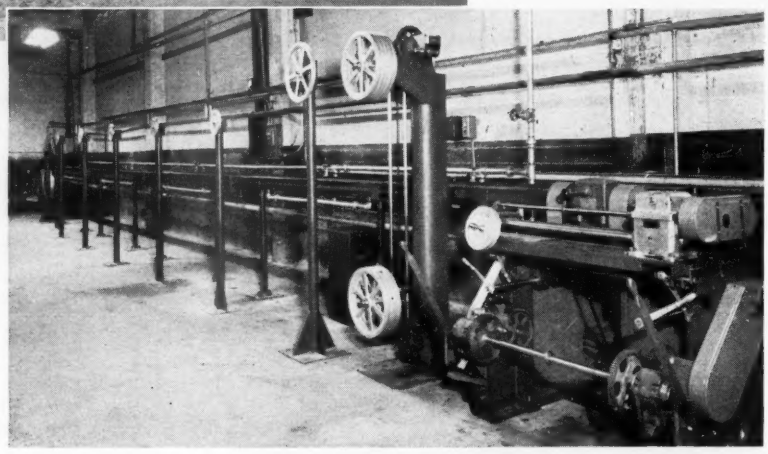
WIRE DRAWING LUBRICANTS
Standard
INDUSTRIAL COMPOUNDS CO.
4600 WEST FERDINAND STREET
CHICAGO 44, ILLINOIS

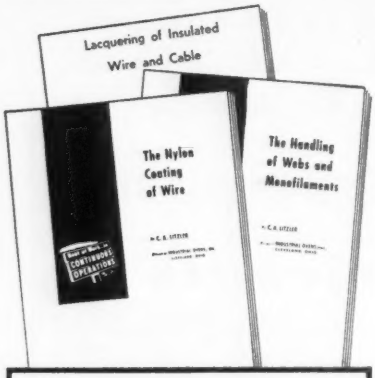
Complete Continuous System for Plastic Jacketing of Wire and Cable



A view from the takeup end of a complete extrusion line with nylon head tuber. Driven letoff stand and tension stand shown in the background.

A view of the same extrusion system showing capstan, cooling trough, tension control stand and continuous takeup machine.




Lacquering of Insulated Wire and Cable
The Nylon Coating of Wire
The Handling of Webs and Monofilaments
CONTINUOUS OPERATIONS

Three Valuable Booklets ...Yours for the Asking

- **"Lacquering of Insulated Wire and Cable"**
- **"The Handling of Webs and Monofilaments"**
- **"The Nylon Coating of Wire"**

Available without charge to wire executives and operating men when requested on business stationery.

● Whether your coating material is nylon, polyvinyl chloride or other plastic or rubber compounds, complete IOI extrusion systems enable you to jacket wire or cable faster and at lower production cost. IOI machines for fine to medium wire sizes are usually equipped with a constant tension system drive and synchronized driven wire payoff stand to minimize actual loads on the wire itself.

Large-diameter wire and cable machines are equipped with heavy-duty constant tension drives. Pneumatically loaded wire accumulators at payoff and takeup ends allow for completely continuous jacketing of wire and cable.

These machines are typical of IOI's versatility in designing extrusion insulating systems. Similarly advanced engineering characterizes IOI equipment for the enameling and lacquering of electrical conductors.

INDUSTRIAL IOI OVENS, INC.

ENGINEERING VERSATILITY

13825 TRISKETT ROAD CLEVELAND 11, OHIO

ALUMINUM LASTS

. . . that means extra sales for you

Even if display racks aren't your line, they belong in your thinking. Better display racks stay bright . . . catch customer's eyes. Better display racks are made of Alcoa Aluminum Wire because aluminum keeps its lustrous finish. This customer-catching advantage can make your products more salable, too.

Alcoa Wire forms easily on your present equipment. Paint it or plate it if you desire . . . aluminum holds the finish. Pound for pound, it goes three times further than heavy metals. Let your local Alcoa salesman give you all the facts and free books like "Alcoa Aluminum and Its Alloys" plus "Finishes for Alcoa Aluminum". Or write ALUMINUM COMPANY OF AMERICA, 1950C Gulf Bldg., Pittsburgh 19, Pa.

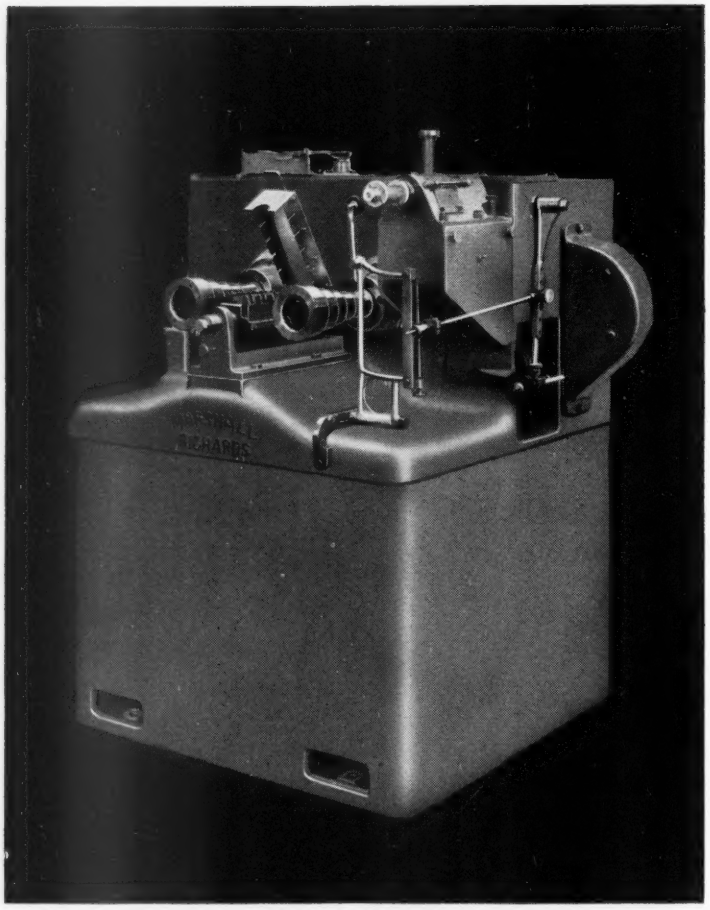
ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM ®

INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS
ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • FOIL • ALUMINUM PIGMENTS • MAGNESIUM PRODUCTS

TO DRAW WIRE TO .0004"...

MARSHALL RICHARDS SUPERFINE MACHINE



Spooling gear of the SUPERFINE is of the magnetic eddy current type which permits the tension on the wire to be adjusted and set within very fine limits before the machine commences to run. With tension set at a value below the breaking load it *cannot* increase while spool is being filled.

CONTINUOUS HIGH PRODUCTION of very fine wire! Without the usual breakages...without spooling difficulties! That's what you get with the Marshall Richards 10.F SUPERFINE Machine. Its precision spooler enables every spool to be filled to capacity at a constant tension, and it can be set with absolute accuracy before any wire is drawn.

The SUPERFINE is specially designed for drawing fine wire. Its two cones—dry drawing—*both draw wire*... the speed increase per step being arranged for a constant die elongation of 16 to 18 per cent. Wire is threaded on the Marshall Richards "figure 8" system... and the elimination of idle cones importantly decreases the slip between wire and cone faces.

Write today for full information about the Marshall Richards SUPERFINE or the complete line of Marshall Richards equipment for drawing wire in all metals and sizes up to 1 inch.

MARSHALL RICHARDS MACHINE COMPANY, INC.

1100 BROAD STREET, TRENTON 10, NEW JERSEY
Telephone, Trenton 9478 Telegrams, Marich-Trenton

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D R A W O N O U R E X P E R I E N C E

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We're READY with quality soaps for every wire drawing need! You can always find the right soap for the job in Swift's complete line. Whatever your specialized need, Swift's Soap Department can fill it. And you'll find that Swift's Soaps for wire drawing uses have efficient lubrication, minimum dusting and dependable uniform quality. You can't buy finer soaps anywhere.

WILLING to put Swift's research laboratory to work developing better products for your purpose! Our technical division is constantly working on wire drawing problems. This means that Swift Soap products always have the quality and effectiveness to help you get better results.

Call SWIFT first for soaps

And ABLE to give fast service from Swift distribution points coast to coast!

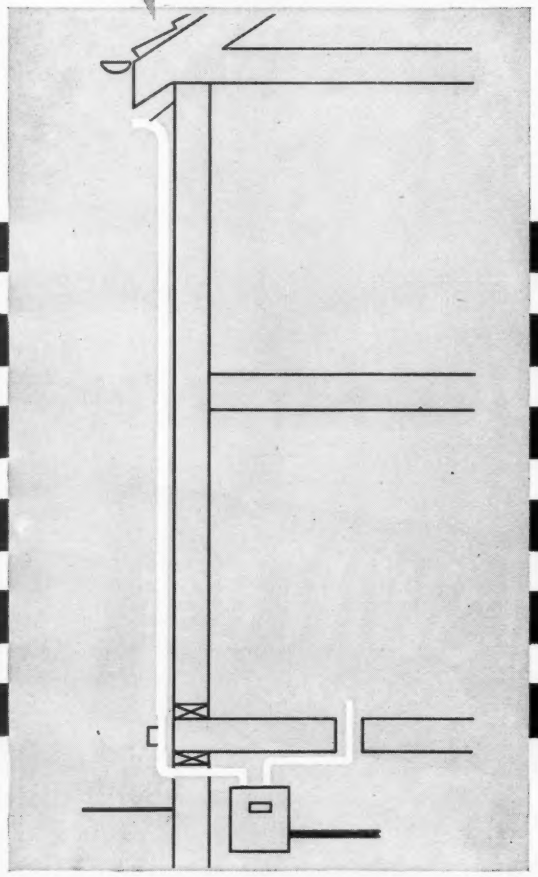
You can order any of the fine soaps listed below and expect immediate delivery. Good soap promotes economy for you . . . better products for your customers.

Powdered White Ribbon • *Guaranteed Powder* • *Snap Heavy Duty Wire Drawing Powder No. 282* • *No. 559 Powdered Soap.*

Plus other special formulations to meet your specifications. See local telephone directory for address of nearest Swift & Company office.

DO YOU KNOW

why tapes reinforced with FIBERGLAS YARNS are used for moisture seal in Service Entrance Cable?



FIBERGLAS* YARNS

- WILL NOT ROT
- WILL NOT BURN
- WILL NOT ABSORB MOISTURE
- HAVE GREAT TENSILE STRENGTH
- MINIMUM SPACE FACTOR

permitting maximum rubber thickness for plus-moisture resistance

- LOW COST!

For complete information about Fiberglas yarns for this and other uses write Owens-Corning Fiberglas Corporation, Textile Products Division, Dept. 875, 16 E. 56th Street, New York 22, N. Y.

OWENS-CORNING FIBERGLAS *Yarns*

*Fiberglas is the trade-mark (Reg. U. S. Pat. Off.) of Owens-Corning Fiberglas Corporation for a variety of products made of or with glass fibers

A CENTURY OF SERVICE TO WIRE MILLS . . . . . .

This year of 1950 marks the One Hundredth Anniversary of the Hartley Tool and Die Company in Thomaston, Connecticut, with the fifth generation of Hartleys carrying on the traditions of service and progress.

Yankee skill and ingenuity have made Hartley wire dies a product of steadily improved quality at steadily reduced prices. Experienced craftsmen assure you of consistently uniform quality.

THOMASTON CONCERN 100 YEARS OLD

Oldest Die Company in Country Celebrating Centennial Anniversary

The Hartley Tool and Die Company, Thomaston, is reputed to be the oldest, continuously operating concern of its kind in this country, according to an announcement made by Earle W. Hartley, owner. The company is currently under the general management of Earle W. Hartley, Jr., who represents the fifth generation of Hartleys to be active in the business.

Founded in 1850 by Joseph Hartley, the original concern manufactured drawn wire and made diamond dies for drawing wire only as a sideline. The first plant was located in Waterbury, Conn. George Hartley, a son of Joseph, developed the die manufacturing branch of the concern and about 1900 turned the control over to William M. Hartley, who was president up to his death, when Earle W. Hartley became manager.

At this time, the original Hartley Wire Drawing Company was split into two concerns, one becoming the Hartley Wire Die Company, recently re-named the Hartley Tool and Die Company. The original dies made by the company were drilled in commercial diamonds in sizes ranging from .004 to .133 of an inch. The development of tungsten carbide within recent years, however, has made possible the construction of much larger dies for drawing wire, rod and tubing.

In 1935 the company became the official distributors for the Carboloy Company of Detroit, Michigan, but continued to manufacture carbide wire drawing dies. This affiliation has been discontinued and the company has returned to the original status of an independent die manufacturer. During the last war 98 per cent of the company's production was devoted to the manufacture of ammunition tools and dies.

The company is currently celebrating the 100th Anniversary of its founding in 1850 by Joseph Hartley.

WATCH FOR THE HEART ON *Every* DIE

your assurance of highest quality and service

L E Y

TRADE MARK REGISTERED

You are cordially invited to avail yourselves of Hartley's engineering facilities on all your die requirements for every type of standard and special CARBIDE DIE.

HARTLEY
TOOL & DIE COMPANY
THOMASTON, CONNECTICUT
Telephone 625 - 626

Flatten

WIRE IN ONE PASS . . .

At 50 to 2000 feet per minute!

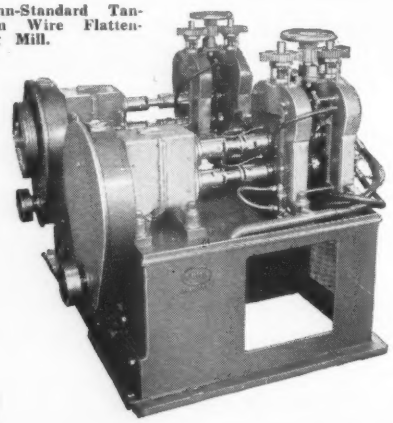
Figure for yourself what Fenn-Standard Tandem Wire Flattening Mills could do to lower your costs and boost production.

These units do the whole flattening job in a single pass at speeds up to 2000 fpm. Units with up to five stands on single or individual base with roll diameters from 3.5" to 12" cover all sizes in ferrous, nonferrous and stainless steel wire.

FEATURES:

- Drive is by herringbone pinion stands through universal joints to eliminate chatter marks on work.
- Rolls easily raised and lowered separately or together.
- Rolling speeds electrically synchronized from stand to stand.
- Traversing or ribbon-wind take-ups.
- Internal or external roll cooling optional.

Fenn-Standard Tandem Wire Flattening Mill.



Shape

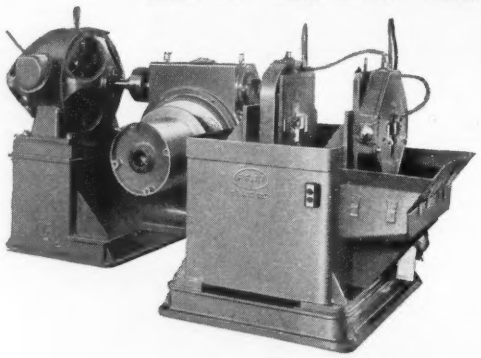
WIRE IN ONE PASS . . .

At speeds up to 1000 feet per minute!

That's what you can do when you put Fenn-Standard Tandem Turks Heads to work turning rounds into shapes. One manufacturer has replaced 5 rolling mills with one Tandem Turks Head . . . others have reduced stock sizes held in inventory because job lots can be turned out so quickly to order.

You can change the heads on these machines in ten minutes. You have no heavy investment in dies. You get higher production rates, greater accuracy, improved metal structure and greater tensile strength.

Fenn-Standard Tandem Turks Head. Range: .040" rounds to 1.250" rounds.



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Fenn also manufactures rolling mills, swagers and presses. For information about these machines, write:

FENN

THE FENN MANUFACTURING COMPANY

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Hartford 1, Connecticut

Shaping Metal for Better and Stronger Products at Lower Cost

High Tensile steel spring wire shaped into lasting comfort for furniture

Foldabed, developed by No-sag Spring Co., Detroit.

YOUNGSTOWN Buckeye high carbon (MB-equivalent) basic steel spring wire goes into many of the high tensile springs, so popular now for upholstered chairs, divans, automobile seats and sleeping car berths.

Youngstown Buckeye high carbon basic steel spring wire, supplied for this and other types of special springs, is produced in gauge, temper and carbon content to meet the fabricator's specifications. It runs true and uniform in strength, ductility and other wanted characteristics, with proper balance in stiffness and workability to produce just the right degree of lasting comfort in the finished spring, without breaking or failure in fabricating operations.

Youngstown Buckeye high carbon basic spring wire is now available in a wide range of grades. Write or phone our nearest District Office.

Youngstown

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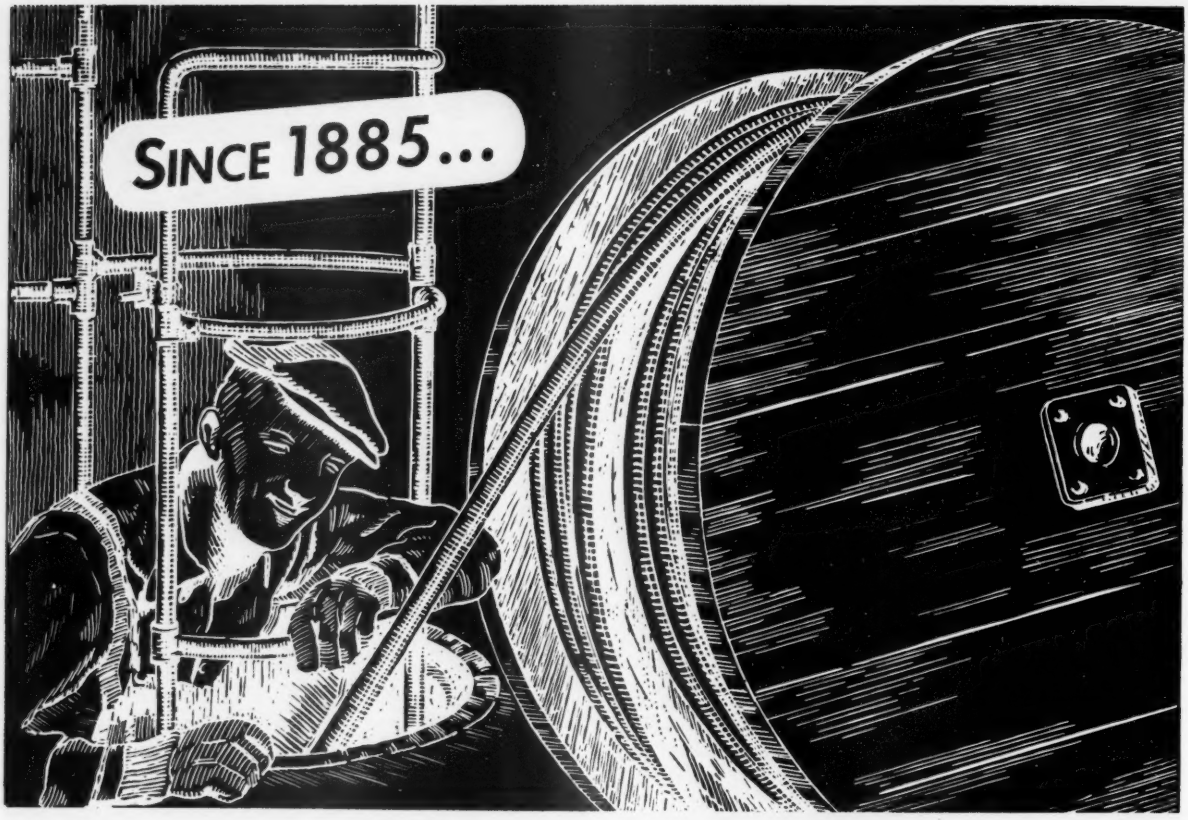

Miles Upon Miles of Underground Cable..

. . . have been lead encased by Robertson Equipment. Many producers of such cable have been specifying and using Robertson Equipment . . . *There must be a reason.*

Robertson products include: Hydraulic Pumps, lead melting pots and furnaces, lead sheath stripping machines, dies, and high pressure hydraulic equipment *for special uses.* Write for complete data.

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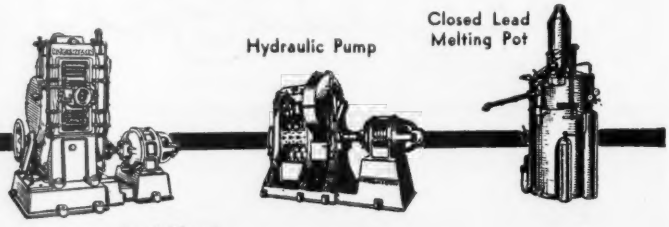
125-137 WATER STREET, BROOKLYN 1, NEW YORK
Designers and Builders of all Types of Lead Encasing Machinery
Since 1885



XLN

a new magnet wire enamel

REVOLUTIONARY!

in all 3 ways

1. Needs no dies
2. Ideal for high speed application
3. Superior-by-comparison in all film characteristics

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ENGINEERS OF FINE FINISHES SINCE 1870

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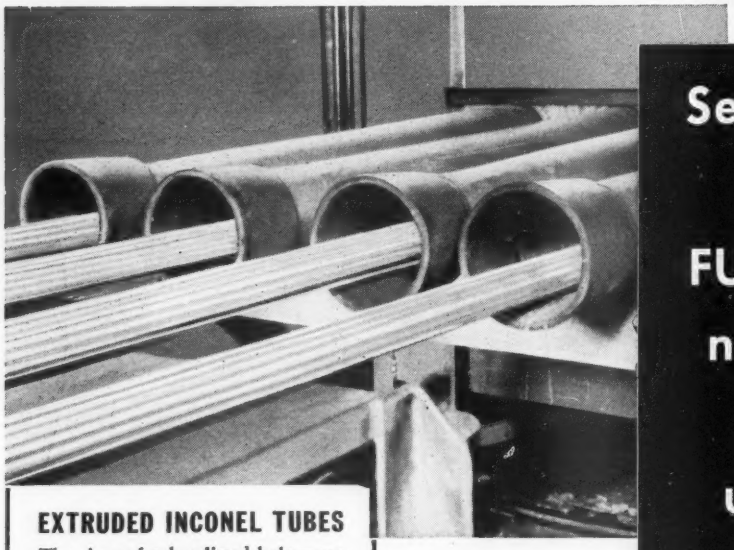
Important News:



Seamless extruded INCONEL FURNACE TUBING now available in large sizes... up to 8½" O. D.

Annealing furnace for treating welded alloy tubing, installed at the plant of the Metal Forming Corp., Elkhart, Ind. INCONEL *tubing shown is 5-9/16 in. with 1/4 in. wall. The furnace operates continuously, 24 hours a day, 7 days a week. A hydrogen-nitrogen atmosphere is used. Temperatures range 1450° to 2000° F., and from these* INCONEL *tubes, the Metal Forming Corp. has received over 11,000 hours of service life.*

EXTRUDED INCONEL TUBES

The sizes of tubes listed below are those which can be produced from tools regularly carried in stock. Other sizes of extruded tubes can be produced on individual order.

O.D.	Wall	Maximum Length
2-1/2"	5/16"	11' 3"
3-1/4"	1/4"	—
3-1/4"	5/16"	17'
3-1/4"	3/8"	14' 3"
3-1/4"	1/2"	12' 6"
4"	1/4"	22'
4"	5/16"	18'
4"	3/8"	15' 3"
4"	7/16"	13' 3"
4"	1/2"	11' 9"
4"	5/8"	8'
4-1/2"	3/8"	13' 3"
4-1/2"	1/2"	10' 3"
4-1/2"	9/16"	9' 3"
4-1/2"	5/8"	8' 6"
5"	1/4"	—
5-9/16"	1/4"	—
5-9/16"	3/8"	14' 3"
5-9/16"	1/2"	11' 3"
5-9/16"	9/16"	10'
6"	1/4"	—
6"	3/8"	12' 6"
6"	1/2"	10'
6"	5/8"	8' 6"
6-1/2"	1/4"	—
6-1/2"	3/8"	11' 3"
6-1/2"	1/2"	8' 6"
6-1/2"	5/8"	7' 3"
7"	1/4"	—
7"	3/8"	10' 3"
7"	1/2"	8'
7"	5/8"	6' 6"
7-1/2"	1/2"	9' 9"
7-1/2"	5/8"	6'
8"	3/8"	11' 9"
8"	1/2"	9'
8"	5/8"	7' 6"
8-1/2"	3/8"	—
8-1/2"	1/2"	—
8-1/2"	5/8"	6' 9"

NOW you can have all the special advantages of INCONEL* *plus* the advantages of seamless, extruded tubing . . . for large as well as small installations.

Here's why!

INCONEL—the heat-resistant, corrosion- and oxidation-resistant INCO Nickel Alloy—is now being extruded in tubing with outside diameters of all the way from 2½ to 8½ inches. Wall thicknesses range from ¼ to ⅝ inches.

Just glance at the table. With such a variety of sizes at your command, you can meet almost any furnace design requirement. Remember, too, that special lengths and dimensions can often be produced to fit specific conditions. You can get INCONEL in standard mill forms, as well as tubing.

Whenever you need a metal to withstand extreme heat, oxidation, corrosion, destructive atmospheres . . . investigate INCONEL. You will discover why this unusual INCO Nickel Alloy is making performance history in the heat-treating field.

Send for your copy of: *"Keep Operating Costs Down When Temperatures Go Up."*

EMBLEM OF SERVICE

INCO TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall Street, New York 5, N.Y.

SPECIFY **INCONEL*** — FOR LONG SERVICE AT HIGH TEMPERATURES

*Reg. U. S. Pat. Off.

Now you can

BAR LIME FROM BAR DRAWING

by using Houghto-Draw 357

Here's news about a better drawing compound for bar drawing, to replace lime.

It's Houghto-Draw 357, one of the new series of drawing compounds you'll hear much about in future months.

Every bar mill man knows the objections to lime coatings—a dirty, hard-to-clean and slower method of preparing bar stock for reduction. Here's the new way:

Pickle the bars in a 10% H_2SO_4 solution containing Houghton's Acitrol pickling inhibitor. Rinse, then immerse for about 5 minutes in a 5-oz.-per-gal. solution of Houghto-Draw 357. Drain, allow to dry, and start drawing. The film is very adherent . . . protects against rust . . . is readily removed in an alkaline cleaning bath after the draw.

Advantages include a cleaner tank with no lime-encrusted lines, slow to heat up . . . brighter finished work . . . faster speed of drawing because there's less frictional heat built up.

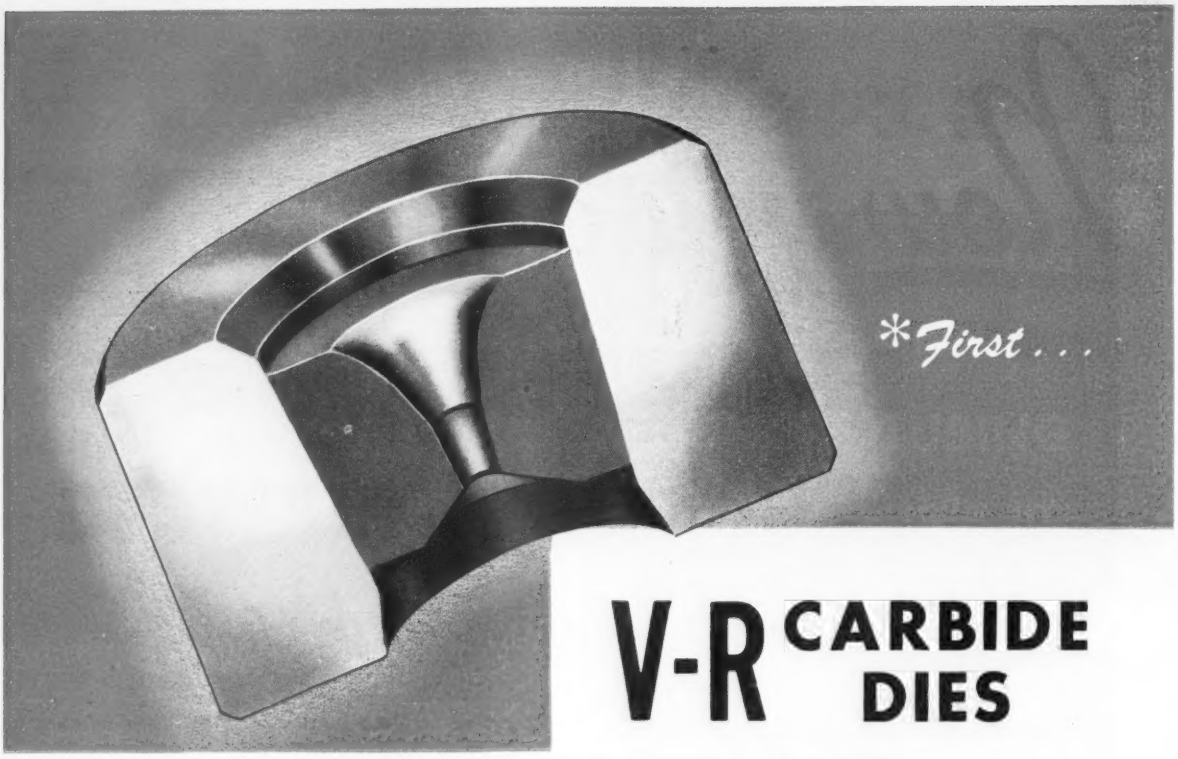
For full data every bar mill man will want, write for Product Data Sheet on Houghto-Draw 357. E. F. Houghton & Co., Philadelphia 33, Chicago, Detroit or San Francisco.

. . . and for wire drawing use Houghto-Draw 1283

Lime coatings preparatory to drawing of carbon steel wire are no longer necessary. Hot rolled coiled rod can be pickled, rinsed and immersed in Houghto-Draw 1283 solution, then air-dried and ready for the conventional draw. No baking or redipping, as with lime. Wire is cleaner and brighter. No more dusty working conditions and dirty machines.

HOUGHTON PRODUCTS FOR METAL WORKING

HEAT TREATING SALTS · INHIBITORS · CARBURIZERS
CLEANERS · RUST PREVENTIVES · DIE LUBRICANTS
CUTTING OILS · "FORTIFIED" OILS AND GREASES



V-R CARBIDE DIES

mean . . . high tonnage output at minimum cost

*First to develop extra wide tapered front and back openings for easy inspection and maintenance. No steel to cut when resizing or refinishing V-R Dies.

*First to design and develop the tapered nib construction increasing internal strength and providing perfect die concentricity.

*First to manufacture Carbide Die with preformed rough cored back relief to eliminate costly die room coring operations over the entire range of hole sizes.

*First to furnish Carbide Dies rough cored to finish, at hole sizes below .015". These rough cored dies are available in dies sizes R-O, R-1, and R-3, rough cored at .004" and .010".

V-R Carbide Dies combine every advantage known to the wire industry.

V-R Carbide Dies, R-1 thru R-6 with the NEW higher nibs are completely redesigned to improve drawing conditions and to allow for heavier drafting practice.

Eliminate unnecessary maintenance and cost NOW by changing to V-R Carbide Dies—The World's Finest!

PHONE

Your Nearest V-R Branch Office for Your Carbide Die Needs Now!

V-R Carbide Tools - Blanks - Dies • Tantung Cast Alloy Tools - Precision Castings • Toolholders - Inserts

V·R CARBIDE and TANTUNG

vascoloy-ramet corporation

WAUKEGAN • ILLINOIS

The Wire Outlook

Optimism continues to be the predominant note in business opinion at least for the first half of this year, with expectation of no more than moderate declines in the second half, if any change at all occurs. These need not be disturbing.

The high level of business activity is being supported by unprecedented demand for most goods and this is the controlling factor. Industry is buying large amounts of machinery and equipment to complete modernization and expansion programs, but this trend is expected to taper off next year, except as newer and better equipment is offered that makes it uneconomic to retain the old.

Construction programs both for dwellings and industry have created a huge demand for materials and equipment, directly and favorably affecting the market of rods, wire and wire products and electric wire and cable. This construction activity is forcing a steady expansion of utility services, to which the wire industry is an important supplier.

As this is prepared for publication, the biggest unfinished piece of business before the nation is the coal strike, which has already affected our industry. Whatever may be said, it is hard to swallow the statement that the coal miners are disobeying the order of their leader to return to the pits. While Mr. Lewis issued such an order for public consumption, it is highly probable that secret orders were simultaneously passed along instructing local leaders to advise the workers to stay out. Is it believable that several hundred thousand men would act in concert otherwise?

Fact-finding as a government instrument to settle disputes is now here to stay. It greatly weakens collective bargaining, but it must be recalled that in their New Deal-bestowed power, labor leaders have not been willing to give and take across the bargaining board. This has been the opportunity for Federal usurpation of dispute settlements that would better have remained in the hands of the parties directly concerned—labor and management.

Copper sales continue strong, although rod and wire mills are not operating at full capacity. Copper wire bar tonnage, rods and wire are freely available.

The lead market has been quiet. Imports have been steady, with little leaving our country. Although lead consumers are buying on a hand-to-mouth basis, the total volume of domestic sales has been fairly good.

Producers' backlogs on merchant and manufacturers' wire products are running two to three months. Nail demand has been exceptionally heavy due to the mild and open winter in many parts of the country. Demand for automotive wire has been exceptionally good. Fencing and barbed wire supplies are tight and in growing demand.

Orders for industrial fasteners have been higher than expected, especially for bolts and nuts, while the rivet market, which has been slow, is showing a marked up-swing.

Price increases on most wire products have already gone into effect as a result of higher steel costs, which has caused some embarrassment to producers since it came at a time when competition was becoming keener. Uncertainties in future pricing factors are causing some fastener manufacturers to quote on the basis of prices prevailing at the time of shipment.

Much is written and said about the continued trend towards the welfare state in this country. The squandering of public funds, the expansion of bureaus, the encroachment upon state rights, the growing power over the fate of private enterprise, the getting deeper and deeper into business in competition with privately owned concerns, all tend toward socialism—the welfare state.

The rosy promises of security and benefits made by self-seeking politicians look good to the uninformed, who seem never competent to understand their crushing cost. No welfare state has or can succeed—here or elsewhere. Inform your Congressional representatives of your personal views, not just once, but at frequent intervals.

—from the Editor's Desk

Offset Competition with MORGAN-CONNOR WIRE MACHINES

MORGAN CONSTRUCTION COMPANY
WORCESTER, MASSACHUSETTS
U. S. A.

MORGAN-CONNOR WIRE MACHINES

The Morgan-Connor Wire Machine is a multiple block, non slip, continuous wire drawing machine of the accumulation type for use with a dry lubricant.

In the system of drawing used on the Morgan-Connor Wire Machine, the wire as required for each block is uncoiled rather than unwound from the preceding block. As the wire is uncoiled, not under tension, from the top of a loose coil, it is impossible for slip to be produced on the blocks of the machine. A continuous machine in which there is no slip is the ideal machine.

The Morgan-Connor Wire Machine is geared to give an increase in speed from block to block is slightly less than the increase required to compensate for the elongation of the wire under the minimum reductions per draft for which the machine is to be used. As a result, there is a slow accumulation of wire on the intermediate blocks. This accumulation of wire causes a time delay between drafts and gives ample opportunity for cooling.

In the Morgan-Connor system of drawing, there is no machine limitation on the maximum reduction per draft which can be taken. A change in the reduction per draft does not introduce slip into the machine.

Details of the machines are as follows:

Clutches

Wire accumulates during drawing on the intermediate blocks of the Morgan-Connor Wire Machine. Each intermediate block is equipped with a disconnect clutch so the individual blocks can be stopped to run down the accumulation. The disconnect clutches permit welded rod or wire coils to be drawn without rethreading the machine during the life of a set of dies.

Blocks

Special fin-cooled blocks accelerate the dissipation of heat of the wire. The blocks are made with internal fins presenting large surface area in the path of the cooling air. The blocks are cast from alloy cast iron and heat-treated to about 350 Brinell at the draft line.

Cooling

The Morgan-Connor Wire Machine is equipped with a highly efficient cooling system to dissipate the heat generated in wire drawing.

The cooling medium is a large volume of air properly distributed and applied. Air is blown on wire at the draft line, through the fins of the blocks, and through and around the coils blocks.

This cooling system combined with the time delay between Machine, reduces the temperature of the wire to a point giving low die cost at high drawing speeds. The drawn at high speed with no detriment

Bearings

Ball or

Wate

Driving Motor

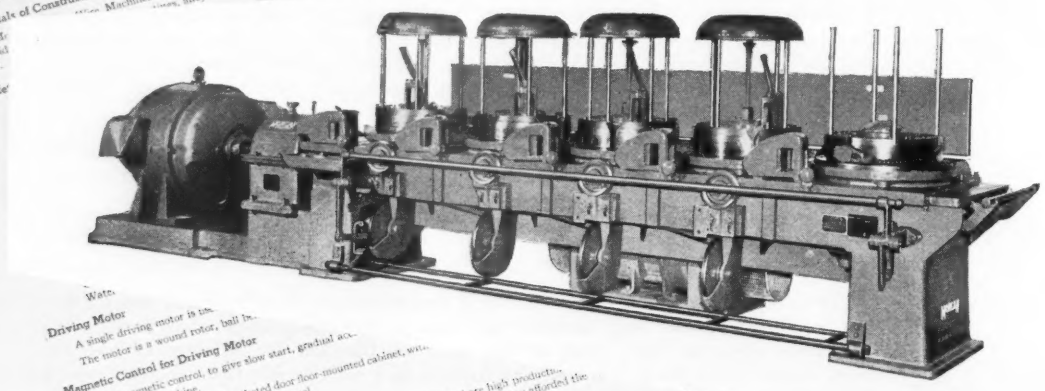
A single driving motor is us
The motor is a wound rotor, ball be

Magnetic Control for Driving Motor

A full magnetic control, to give slow start, gradual acc
included for each machine.
The control is in a standard gasketed door floor-mounted cabinet, wit
in a ventilated enclosure and wired to the panel.

Advantages of Morgan-Connor Wire Machines

The outstanding features of Morgan-Connor Wire Machines as described are high productio
man hour, high production per unit of floor space, low die cost, low power cost, and safety afforded the
operator.



High production per man-hour . . . high production per unit of floor space . . . low die cost . . . low power cost . . . safety for the operator.

Write us for details.

WM-45

MORGAN CONSTRUCTION COMPANY
WORCESTER, MASSACHUSETTS

WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 25 MARCH, 1950 No. 3

Designated as

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Reg. 511,530 U. S. Pat. Off.

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FLANGED STEEL TRAVERSES

. . . offer wire rope users and manufacturers rugged construction, simple 4-step reel assembly and long life—the same qualities that have made them first choice of thousands for wire and cable reels.

Niles Flanged Steel Traverses are manufactured in a wide range of sizes up to 56" diameter and 48" traverse... in plain, painted and hot dip galvanized finishes. The special "Reinforced Type" has *extra strength* where it is needed most—at bolt holes and base of the flange—yet saves weight through use of lighter gauge steel. Width of flange and number of bolt and drain holes are furnished to your specifications. Available for prompt delivery. Write for prices.

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MEASURE AND PRINT

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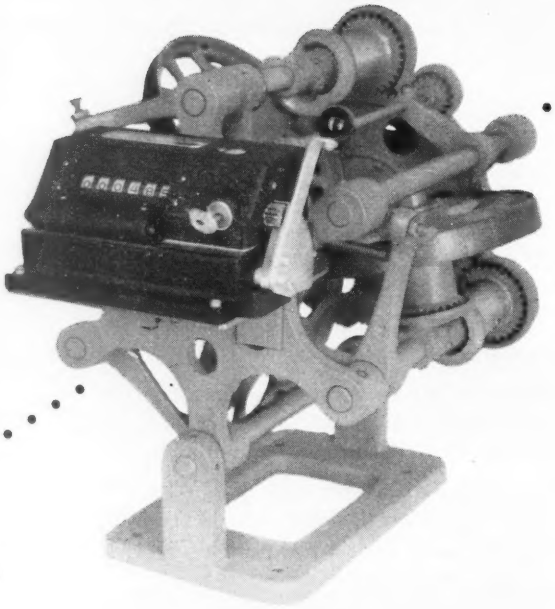

JLE Footage Measuring and Printing Unit!

Does *two* important jobs quickly, automatically, accurately! Permits easy measurement of wire or cable footage and prints total on tag attached to reel.

The unit can be adapted to print distances to insulation faults.

Another JLE *contribution to progress in the wire industry.*

JAMES L. ENTWISTLE CO.

43 CHURCH STREET, PAWTUCKET, RHODE ISLAND

30 YEARS OF SERVICE TO THE WIRE INDUSTRY

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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 25 MARCH, 1950 No. 3

Forty-six Years of "Know-How" Built into the New Colorado Fuel and Iron Rod Mill at Pueblo

The new steel rod mill at Pueblo, Colorado, is the last word in modern equipment and layout, embodying some features that are entirely new. This description of it should prove of interest to many of our readers.

WHEN a small group of people gathered together in 1903 to throw the switch on the "new" Garrett Rod Mill at the Pueblo plant of CF&I, they probably failed to realize they were also sending a high-voltage charge into the economic lifelines of the Rocky Mountain region. But that old Garrett Mill marked the beginning of a new era in the industrial development of Colorado.

★ ★ ★

THE pages of Western history have long been permanently tied together with a binding of steel wire. Barbed wire that fenced in cattle ranges; field fence to protect farm land fortunes; baling wire that brought the King Midas touch to grassy pastures . . . yes, and wire that has brought jobs to skilled men who chose to weave it into family items ranging from lamp shades to coat hangers.

★ ★ ★

NEARLY a half-century of "know-how" in rod making is combined in the new five-million-dollar mill at the Pueblo plant of CF&I. That's why it is unquestionably the most modern mill of its type in America today.

★ ★ ★

THAT cluster of shiny, new steel buildings at Pueblo's CF&I is a monument to those men who gathered to throw the switch at the old Garrett Mill in 1903.

★ ★ ★

New Rod Mill Is Complete Installation

THE new Rod Mill is a complete installation and includes new rolling facilities, new buildings, new stock and product handling facilities, new re-heating furnace, a new billet yard and other accessory units.

★ ★ ★

THERE are five connected buildings including the mill building, motor room, furnace building, roll shop and comfort station. Five lean-to buildings house the guide shop, control room, electric and machine shops and a room to house the break-down mill motor. Three separate buildings accommodate the office, boiler house and a covered dock for loading the shuttle car.

★ ★ ★

ABOUT 87,500 square feet of floor space is under roof. If you cleared the machinery out of the mill room you could have an indoor football field with space remaining for spectators.

★ ★ ★

ALL buildings are steel frame with concrete curtain walls, with the exception of the office building and comfort station which are of brick and tile construction.

★ ★ ★

Comfort of Workmen Gets Top Priority

WORKMEN find the new mill spotlessly clean, adequately ventilated and brilliantly lighted. Industrial engineers acclaim it to be an "ideal place to work."

★ ★ ★

WINDOWS are used only in the shops, offices, comfort station and break-down mill motor room. Steel louvres in place of windows are used in the mill building, furnace building and shuttle car loading station to provide ventilation. Mill and furnace buildings have open monitors.

★ ★ ★

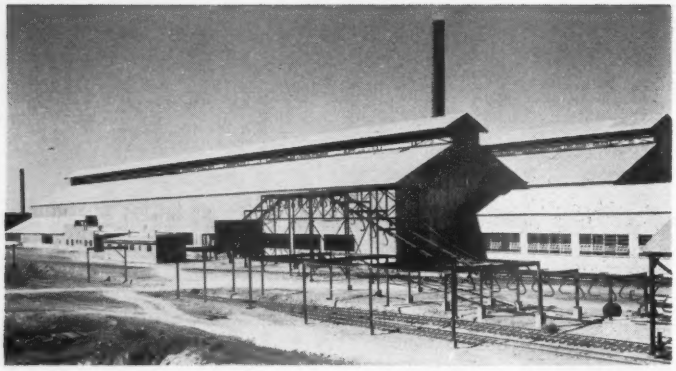


Fig. 1—New building housing the five-million-dollar Rod Mill at the Pueblo plant of CF&I.

THE mill is illuminated by a combination of mercury vapor and incandescent lamps, alternately spaced, which gives an average illumination of 15-foot candles.

★ ★ ★

THE comfort station provides facilities and showers for 120 men. Separate rooms are provided for clean and dirty clothes. Lockers are provided for clean clothes; dirty clothes are placed on a hook and raised to the ceiling on a chain and pulley, locked up and heated and ventilated.

★ ★ ★

Increased Production Is Goal of CF&I

AN outstanding advantage provided by the new rod mill is that 700-pound bundles will be provided for handling in the Wire Mill in place of the old 165-pound bundles. To handle this increased production a battery of 14 new Vaughn continuous wire drawing machines have recently been placed in operation. These machines will draw the rod from the new rod mill into the myriad of CF&I wire products. To further assure the best quality wire products at the lowest possible price CF&I also has recently installed new galvanizing equipment, high speed netting and welded fabric machines.

Fig. 2—Heavy steel billets stacked as neatly as match sticks.

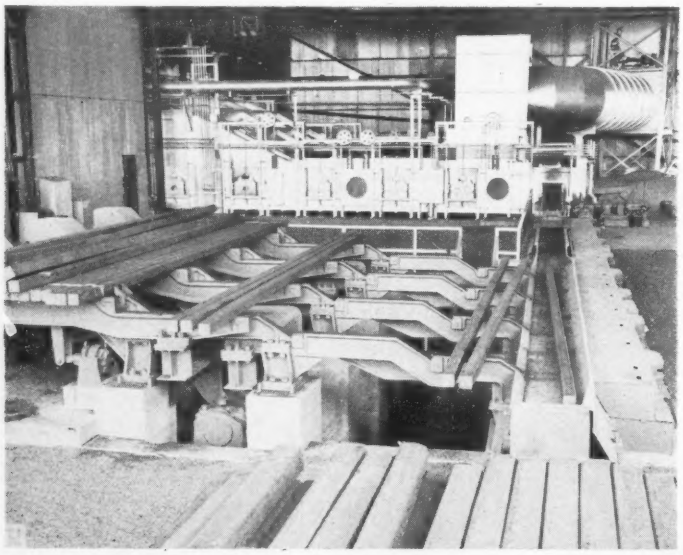


Fig. 3—This billet "unscrambler" is the first of its kind to have been built.

★ ★ ★

Tons of Steel Handled by "Magic" Touch

"MAGICIANS" whose skilled fingers operate the controls of great magnets, conveyors and electric cars defty handle the tons of heavy billets that are transformed into bundles of steel rod.

★ ★ ★

ONE of these "magicians" rides high in the air as he guides a 15-ton magnet crane back and forth in the billet yard and furnace building of the new rod mill at CF&I's Pueblo steel mill.

★ ★ ★

HE can stack 22-foot steel billets as neatly as match sticks. And he lifts the billets out of storage and starts them racing on their fiery dash into furnaces and rolling machines.

★ ★ ★

THE combined billet yard and furnace building at the new rod mill is a big place. It has a span of approximately 96 feet and is 250 feet in total length.

★ ★ ★

THE billets are 22-feet long and four and three-eighths inches square, and are produced in the Pueblo plant's rail mill. They are delivered to the rod mill on special billet handling cars and upon arrival are either placed onto storage racks or taken directly to a billet arranging machine. Storage space has been provided for approximately 8,000 tons of billets.

★ ★ ★

Billet "Unscrambler" Is First of Its Kind

THE billet arranging machine, furnished by the Morgan Construction Co., is the first of its kind to have been built. Workmen call it an "unscrambler"—'cause that's exactly what it does. The machine separates the billets and

feeds them into the furnace one at a time. You can place as high as 27 tons of billets on the machine at one time, and it very neatly "unscrambles" the batch and transfers them sideways onto the furnace charging table. Should the billets become bent the machine puts them into alignment and then shuffles them to the furnace charging table.

★ ★ ★

THE "unscrambler" is operated by the furnace charging man from a control station. No labor is required at the machine, thus eliminating a very hazardous occupation. The unscrambling of heavy, steel billets by hand was a task that often resulted in broken legs when the stack would shift and catch the workman.

★ ★ ★

THE installation of this modern piece of equipment is another "first" for CF&I at Pueblo. It means a "first" in safety for workmen as well as a "first" for increased production in the handling of heavy steel.

★ ★ ★

Huge Furnaces Heat 60 Tons Of Steel an Hour

THEY'VE captured the flames of hades, sealed them in big, shiny furnaces and are using them to heat billets of steel at the new rod mill which CF&I has opened at its Pueblo plant.

★ ★ ★

WITH a mighty roar the two gas-fired furnaces heat the billets to a glowing red. Great bars of red-hot steel may then easily be rolled into rods that compare in size to an ordinary lead pencil.

★ ★ ★

THE two furnaces are the billet heating furnace and the holding furnace; the latter receives the steel after it has been rolled in the breakdown mill. Purpose of the holding furnace is to reheat the steel to the temperature desired for rolling rods.

★ ★ ★

THE billet heating furnace gobbles up approximately 60 tons of billets an hour. It has a hearth 69 feet long and 26 feet wide.

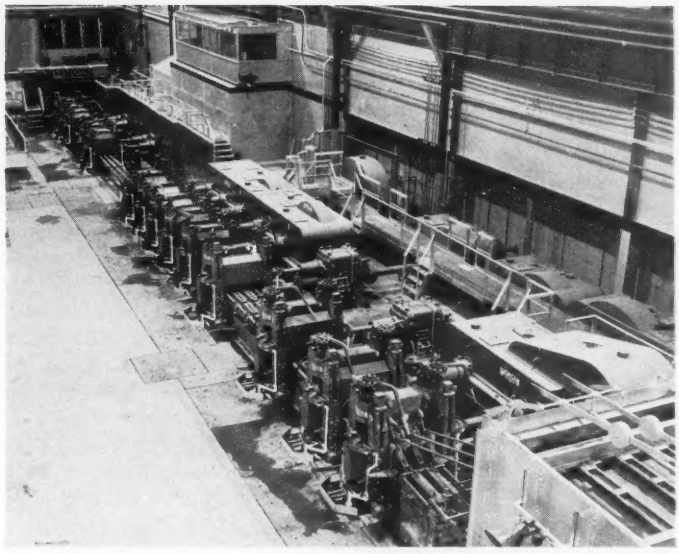


Fig. 4—Through these machines steel rod zips at an estimated speed of 156 miles per hour.

★ ★ ★

WALLS of the furnace are encased in steel bindings and have vertical expansion joints to allow the brickwork to expand freely without rupturing the steel binding when the furnace is brought up to operating temperature. The roof is completely suspended from the steel framework and refractory hanger tiles are used to hold the roof brick in place.

★ ★ ★

Automatic Controls Assure Top Safety

IN order to safeguard against explosions in the furnace, several automatic controls are in use. These controls automatically shut the gas off the furnace when the combustion, air pressure, gas pressure or oil pressure are low; when there is an electrical failure or when the compressed air used for the gas pressure controller fails.

★ ★ ★

THE safety equipment is operated by springs or weights and does not require pressure or power for closing. Gas to fire these furnaces comes from the coke plant of CF&I at Pueblo, where gas is just one of many by-products obtained from coal.

★ ★ ★

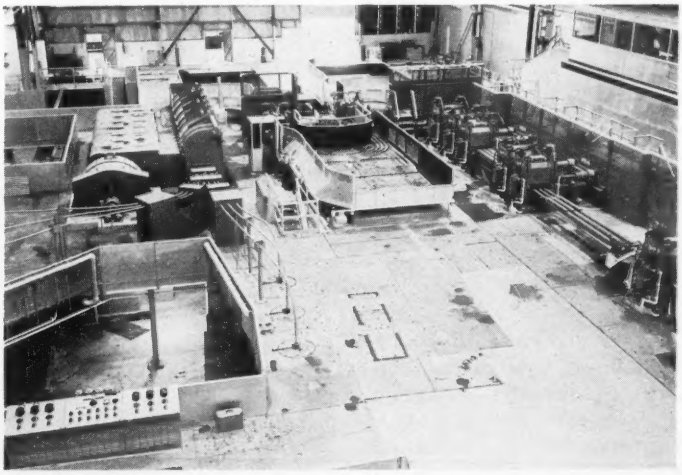


Fig. 5—Arrangement of equipment necessary to turn rods around and start them back through additional rolls.

Rods Zip Thru Mill At 156 Miles Per Hour

IF the boys should forget to close the door, and walk off and leave things running at the new CF&I Rod Mill in Pueblo it would take only 45 minutes to have a continuous steel rod racing through the streets of Denver!

★ ★ ★

OF course there's no chance of that ever happening, because the rods are cut and reeled into bundles; but it will give you an idea of the high speed operation that has been incorporated into America's most modern Rod Mill at Pueblo.

★ ★ ★

RED-HOT rods of steel zip through the various reduction rolls at an estimated speed of 156 miles per hour.

★ ★ ★

WHEN the public address system booms out the order, "let's roll 'em", the boys are not kidding! Here's what happens:

★ ★ ★

THE billet-holding furnace spits out a chunk of red-hot steel that is 22 feet long and four and three-eighths inches square. As you blink your eyes a couple of times the billet has passed through four "breakdown stands" and has been reduced to two and one-half inches square and about 34 feet in length.

★ ★ ★

IT is held in another furnace, brought back up to red hot and then goes racing through 23 Morgan Mill "stands" where it is rolled out into a rod not as big as your little finger. It is delivered to a pouring reel which spins it into a 700-pound bundle. The whole operation takes just about as long as it took you to read this!

★ ★ ★

THERE are six reels which deliver bundles to two flat conveyors. From the flat conveyors the bundles are carried by a hook conveyor to an unloading station where they are loaded on an electrically operated shuttle system which transports them in carload lots to the Wire Mill docks.

★ ★ ★

Special "GLASS HOUSE" Lets Visitors See Race

VISITORS to the new Rod Mill are provided with a specially constructed observation platform from which they can see the "race of the red hot snakes." The platform is 12 feet above the mill floor and spectators can walk 48 feet behind safety plate glass. Below them they will see the glowing red rods of steel speed around the reversing loops three-at-a-time and finally disappear into the basement to emerge peacefully coiled.

★ ★ ★

THE mill is spotlessly clean. The mill machinery is painted battleship gray. The color scheme is carried out in "caution colors." Light blue means "Hands off—it's hot"; yellow is caution, red is danger and all structural steel at eye level has been painted a visible green as another safety factor. Spectators will find the new CF&I Rod Mill a symphony of color combined with the high-speed rhythm of production.

★ ★ ★

Motor Room Is Picture of Beauty and Cleanliness

AIRLINE passengers who travel in a pressurized cabin, free from dust and drafts have nothing on the men who work in the motor room at the new CF&I rod mill at Pueblo.

★ ★ ★

THESE workmen may not be traveling, but they're certainly living in ideal surroundings, and their "cabin" comprises some 10,000 square feet of floor space.

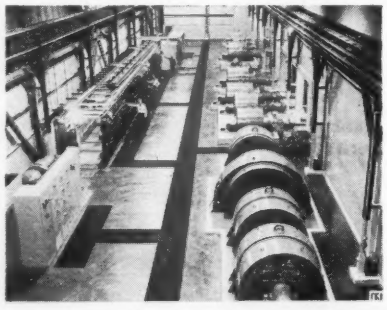


Fig. 6—The motor room at the new CF&I rod mill in Pueblo.

★ ★ ★

THE motor room at the new rod mill is kept under a positive pressure with the basement under a partial vacuum in order to circulate air through the mill motors. The only opening in the motor room walls, except for doors which are rubber sealed, is to provide make-up air which is scrubbed, and heated or cooled as the season demands.

★ ★ ★

THE cement floor is brick red, with color poured into the concrete. Battleship gray motors rest on bases of pastel green and vivid yellows and blues combine to make the room a study in design.

★ ★ ★

THE 6600 volt, three-phase, 60 cycle power for the new rod mill is controlled by 12 sections of General Electric metal-clad switchgear.

★ ★ ★

Mill Operator Controls All Motors

THE operation of all mill motors is controlled by the main mill pulpit operator. He sits in a booth high above the mill floor, encased in safety plate glass. From this vantage point the operators can command an over-all view of the mill and the various signals. A control desk is provided with voltmeters and meters to indicate load and speed.

★ ★ ★

CONTROL desks are provided near the laying and pouring reels which gives reel operators full control of the rod after it leaves the mill.

★ ★ ★

PUBLIC address microphones are provided at all control desks. Thruout the mill there are large loudspeakers to carry the commands of the operators. The system is complete with noise-cancelling microphones and all speakers operate from each microphone so that any operator can give warning or directions to the entire mill.

★ ★ ★

THE motor room, control system and signal system provided at the new CF&I rod mill have been acclaimed the most modern installation of this type in America.

* * *

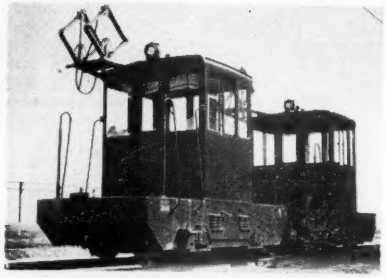


Fig. 7—"Toonerville Trolley" for moving rods to the wire mill.

Toonerville Trolley Pops Up As Modern Steel Mill Vehicle

"IT'S the Toonerville trolley!" That's what steelworkers at the new CF&I Rod Mill in Pueblo exclaimed when they saw the new electric buggy that was designed to transport finished bundles of wire from the Rod Mill to the Wire Mill.

* * *

THAT'S the way names get started in a steel mill . . . and anyone will have a hard time changing the name of the electric shuttle car system.

* * *

THE conveyor system in the new Rod Mill is one of the most modern in America. After the 700-pound bundles of steel rod are dumped off of the reels they are carried by flat conveyors from the basement of the new mill building up above ground level where they are transferred to hook conveyors.

* * *

THE hook conveyor has approximately 900 feet of effective cooling length, and from the hook conveyors the bundles are loaded on the "Toonerville Trolley" for a short trip to the Wire Mill.

* * *

AN elaborate system of transporting both the unfinished billets to the Rod Mill and the finished bundle to the Wire Mill had to be engineered before the new mill could be put into operation.

* * *

SPECIAL railroad cars were built to transport the billets from the Rail Mill to the new Rod Mill.

* * *

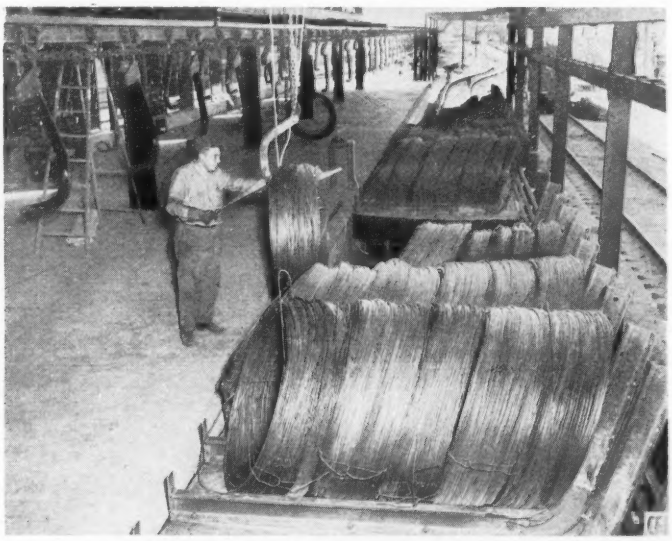


Fig. 8—Finished bundles of wire delivered to this unloading station by a hook conveyor.

CALENDAR of MEETINGS in 1950 of the WIRE ASSOCIATION

April 21st
Annual Directors' Meeting and Luncheon. Biltmore Hotel, New York City. Luncheon at 12:30 P.M. All members invited.

May 11th and 12th
Mid-West Regional Meeting of the Wire Association at Peoria, Ill. Technical papers, banquet and plant visit. Don't miss it!

June (date later)
Pacific Coast Regional Meeting at San Francisco, Cal., at Sir Francis Drake Hotel. Always a good meeting.

October 23-26, incl.
Annual Convention of the Wire Association at Baltimore, Md., Lord Baltimore Hotel. Make reservations now to attend.

Program details will be published in Wire and Wire Products. Watch for them, please, but in the meantime, make plans to attend.

THE WIRE ASSOCIATION

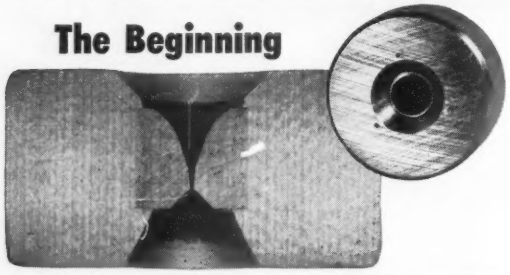
RICHARD E. BROWN, Executive Secretary

300 Main Street — Stamford, Conn.

CARBOLOY pays off like ... longer life through more

Here's Proof of the special performance you get with Carboloy Cemented Carbide dies. Read this amazing case history. It's a record that's repeated time and again wherever and whenever progressive manufacturers specify Carboloy . . . *a record you might well post in your plant.*

The Beginning



Here is an unretouched photograph of a Carboloy R3 wire draw die, as delivered to manufacturing site. Starting hole size was .015" and maximum recommended hole was .182".

The End

Completely unretouched, this photograph pictures a Carboloy R3 die finished and refinished many, many times to .290", *almost twice* the recommended maximum. Surface casing stampings of bore sizes were so numerous they had to be machined off to start afresh.

REMEMBER . . . there is *no* substitute for Carboloy quality.

When you specify Carboloy dies, you get maximum die performance. Each die is backed by these Carboloy guarantees of quality and service:

1. **Continuous grade improvement**—to meet problems brought about by metallurgical developments, rather than changing grades.
2. **Product superiority**—nibs refinished through range of hole sizes; casing process provides maximum nib support, traverse and longitudinal strength.
3. **Guaranteed quality**—backed by 29 rigid tests to meet the most exacting requirements of industry.
4. **Performance record**—proved by amazing case history records reported by users in industry.
5. **Unequalled service** — technical consultation, trouble-shooting assistance, field service to users, unequalled in industry.
6. **Engineering and research**—the nation's largest and most complete facilities devoted to carbides.
7. **Production facilities**—the finest for mass production of cemented carbide tools and dies.
8. **Training program**—unique service, through Die Service School, to train your representatives in die department operation.
9. **Fast delivery** — through strategically located branches, for immediate service on commonly used dies.
10. **Acknowledged leadership** — in carbide field, actively engaged in development of cemented carbide dies since 1928.

For complete Die Service Manual D-119, or for further information or special consultation, write: Carboloy Company, Inc., 11171 E. 8 Mile Road, Detroit 32, Michigan.

PROTECT YOUR DIE INVESTMENT

SPECIFY **CARBOLOY** ®

CEMENTED CARBIDE

this on your die investment finishes to larger hole sizes

Other Carboloy products for unusual performance

UNUSUAL performance is right! And no wonder, for these dies are of Carboloy Cemented Carbide—*the hardest metal made by man.* You'll get longer die life, increased production and lowered manufacturing costs as standard practice with them. Here's the story on these dies . . . and their special performance.

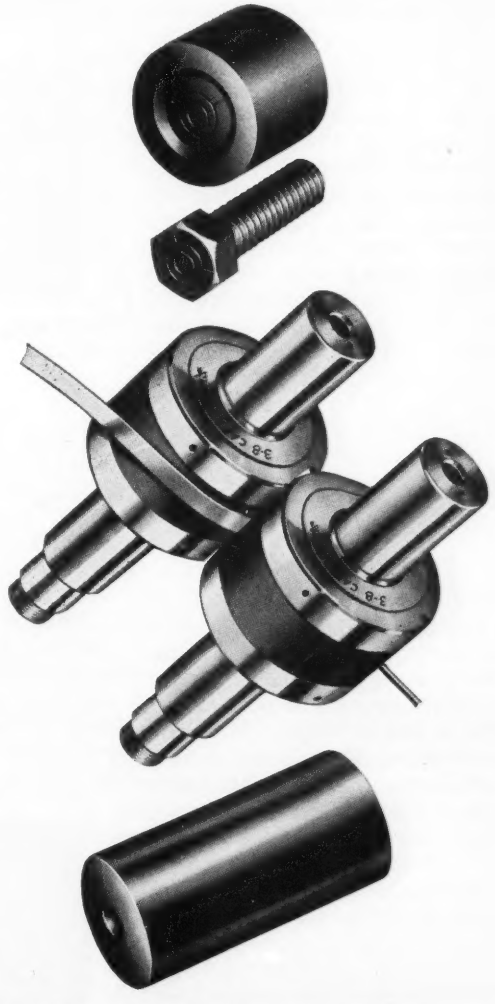
CARBOLOY'S HEADING HAMMERS

Supplied in any male or female marking, pattern or numeral specified. Can be reground for plain heading after marking is worn.

SPECIAL . . . and how!

That's the only way you can look at the records set by this Carboloy die. Nib life is undetermined, *because all original estimates have been discarded as too low.* The 3,000,000 mark was reached without any noticeable signs of wear. It has outlasted steel 30 times and is still going strong.

Don't wait any longer to get this "special" Carboloy die working for you!



CARBOLOY'S FLAT WIRE ROLLS

For rolling either high or low carbon steel wire. Better finish on end product, and more uniform wire throughout run.

UNUSUAL? You be the judge!

Carboloy flat wire rolls have set time-, labor-, and money-saving records that can't be overlooked . . . records like these:

- **No regrinds even after 1 *continuous* year's operation.**
- **Reduced setup time by 75%.**
- **Cut spot change downtime 97%.**

All this is the rule, not the exception, in Carboloy flat roll performance.

WHY NOT start the special benefits rolling in your mill with these Carboloy dies *now?*

CARBOLOY'S HEADER DIE NIBS

Now in stock! Rough cored Carboloy header die nibs. For fasteners up to ⅜".

ANOTHER "Special"! Carboloy rough cored header die nibs, with unusually high resistance to shock and wear, will save you time, save you money and bring you all the benefits of Carboloy quality. Maintain a stock of them, make your own header dies and get them on the job faster.

Wire and Tube Drawing Dies

- **Standard mandrels and nibs**
- **Standard guide rings**
- **Standard square dies**
- **Standard round-hole dies**
- **Standard hex dies**
- **Standard shape dies**

Non-Ferrous Wire Manufacture in England

A description of the Equipment and processes in the wire mills of the Elliott Works of the Imperial Chemical Industries, Ltd., Metal Division. It is reprinted from Metal Industry of London, England, through the courtesy of the publishers, The Louis Cassier Co., Ltd.

AN area of a little over eleven acres is occupied by the Elliott Works of Imperial Chemical Industries, Ltd., Metals Division. The original factory on this site dates from 1853, and over the years wire, tubes, plates, hot and cold rolled sheets have been produced. The production of tubes and cold rolled sheets has been transferred to other factories of the Metals Division, and the main products now are wire, tape, hot rolled plates, and a small quantity of hot rolled sheets. In addition to the mills devoted to the production of these items, the factory includes electric and crucible melting departments, and a copper refinery together with copper recovery plant for dealing with slags, residues and drosses. Some description of the manufacture of the various products is given below, but the greatest attention is paid to wire production, as the other items are also manufactured in other works of the Division and will be described in subsequent articles.

★ ★ ★

Alloys Used

COPPER and a large variety of alloys are produced as wire in sizes varying from 0.012 in. diameter up to ¼ in. diameter. Larger sizes can, however, be produced as required. The variety of alloys calls for a wide variation in the method of production, but, generally speaking, wire drawing commences from a base rod of about 5/16 in. diameter, which can be manufactured by several different methods according to the metal or alloy.

★ ★ ★

COPPER — High conductivity copper wire bars of up to 250 lb. weight are hot rolled through a guide mill, which consists of one set of 3-high breaking-down rolls and a looping train of 5 stands. The first two stands are 3-high rolls, giving two passes each, and the other three are 2-high giving a further three passes, making in all 16 passes of alternate squares and ovals from the wire bar down to 5/16 in. diameter round rod. All looping is carried out by hand, but the final coiling is upon a steam-driven coiler. In addition to the 5/16 in. copper rod produced in the guide mill, ¼ in. rod is also purchased, mainly from Canadian sources.

★ ★ ★

HOT-ROLLED ALLOYS—In the past the alloys mainly produced by hot rolling consisted of: 90/10, 85/15, 80/20, 70/30 and 66/33 copper-zinc; 65/18/17 copper-nickel-zinc; 96/3/1 copper-silicon-manganese, "Everdur"; 88/10/2 copper-manganese-aluminum, "Kumanal"; 99/1 copper-tin, P.O. bronze; and 99.2/0.8 copper-cadmium, although in many instances the process has recently been modified as described later. For the hot-rolling process, an alloy may be cast in the form of a billet, 6 in. diameter, which is broken down hot to about 3 in. diameter, or is in the form of a wire bar suitable for direct treatment. In either case, the process is similar to that adopted with copper, but the passes are more gently graded, and there is a second set of 3-high breaking-down rolls before proceeding to the looping train. The billets or wire bars have 11 passes on the first breakers, 4 passes on the second breakers, and 7 on the looping train, making 22 passes in all. The product again is 5/16 in. diameter rod.

★ ★ ★

EXTRUDED ALLOYS—Brasses containing alpha or alpha and beta constituents, with or without lead, such as: 70/30 copper-zinc; 61/39 copper/zinc; 62/36.5/1.5 copper-zinc-lead; and 61/36.5/2.5 copper-zinc-lead (leady wire), are received at about 5/16 in. diameter from the Holford Extrusion Mills.

★ ★ ★

COLD-ROLLED ALLOYS—Formerly, many alloys were cast in the form of the so-called "sash bar" at about 1⅜ in. square section by 6 ft. 0 in. long, and rolled upon slow mills by alternate square and oval passes down to 5/16 in. diameter rod. Many intermediate annealings were necessitated, and the process was slow and costly. Over the last decade methods have

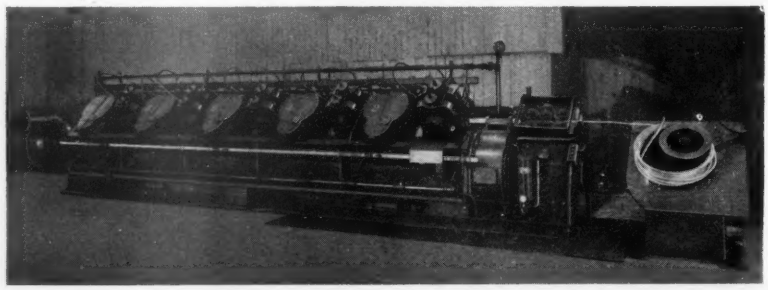


Fig. 1—10-stand tandem rod rolling machine.

been developed of hot rolling many of the alloys from billets and finishing to 5/16 in. diameter upon the cold rolls. However, the introduction of a 10-stand tandem rod rolling mill by the Waterbury Farrel Co. (see Fig. 1) has so revolutionized the technique and economics of cold rolling that the old cold-rolling process is now confined to the high tin bronzes and special alloys. The Waterbury Farrel machine, the first to be operated in Europe, receives rod at about ⅞ in. diameter or ¾ in. square, prepared in the former case by extrusion, and in the latter by hot rolling, and delivers it to an automatic coiler at 180 ft./min. in a section 5/16 in. square with radiused corners. The successive stands are inclined alternately at 45° to the right or left of the vertical, so that the rod, although not actually rotated, is in effect turned through 90° between the stands. The machine is of a precision character, and the rod, which is reduced 15 per cent in cross-sectional area at each stage, retains throughout the rolling a square section with radiused corners. The product is of a very high quality, and forms an ideal base for wire drawing.

★ ★ ★

PIN AND RIVET ALLOYS — The base rod for certain varieties of the 60/40 copper-zinc alloys is still produced by an old process of slitting and welding which is being displaced by the more modern method of extrusion.

★ ★ ★

Wire Drawing

THE wire-drawing process is either by single-hole drawing upon single blocks, or continuous drawing upon multi-die machines. In order to reduce change-over and handling delays, wire rod stock is butt welded by resistance methods to obtain the heaviest coil weights which can be handled. In both cases the dies, throughout the works, for the drawing of round wire are mainly of tungsten carbide set in steel cases for the large sizes of wire, say, above 0.040 in. diameter, and diamonds in brass cases for the smaller sizes, say, below 0.060 in. diameter.

★ ★ ★

Drawing Dies

THERE are three die shops, one attached to the copper wire mill and one to the alloy wire mills. These are devoted to the manufacture and maintenance of tungsten carbide dies. The third die shop, which is located in the laboratory, deals with diamond dies and the smaller tungsten carbide dies. The tungsten carbide dies are purchased in the form of pellets with a conical entrance and the centre hole already formed. As a first operation, the pellets are set into steel cases. Drilling and polishing of the dies is carried out on machines which use shaped steel needles coated with abrasive powder suspended in olive oil. Both needles and dies may rotate, and

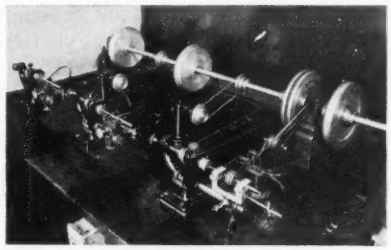


Fig. 2—Machine for polishing diamond dies.

the needle is given also a reciprocating motion along its axis. The abrasive powder, usually boron carbide or diamond dust, is applied in successively finer grades until the requisite shape is obtained. The final polish is obtained by hand lapping with a willow stick coated with diamond powder. The contour of the die is generated by the relative inclinations of needle and die, and by the form of the needle. Similar conditions apply to the polishing of diamond dies, which are received as diamonds already set in brass cases. The polishing plant is, however, of a smaller and more delicate nature (see Fig. 2).

★ ★ ★

ANY section of a die taken perpendicular to the wire axis should be truly circular where round wire is concerned, but a section taken in the plane of the axis will reveal a contour which consists of a number of separate parts. The British Standard 1393: 1947 for reinforced diamond dies shows six such parts. Starting at the entry side, there is a wide entrance in the form of a cone or bell succeeded by an approach angle. The wire, entering the die, will not normally come in contact with these two areas which serve the main purpose of facilitating the entry of lubricant. The third section consists of the reduction angle and the exact point at which the wire contacts this portion of the die will depend upon its diameter. The fourth section, termed the bearing, is cylindrical. The length of this is quite short, but it will largely determine the life of the die. The two following sections consist of reversed cones, the first being a very short relief angle followed by a wide angle exit. The various conical angles and length of parallel portion will vary according to the metal or alloy which is to be drawn, the amount of reduction which is to be effected and according to the experience of the user. In practice, the various sections of the die contour merge into each other.

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IN addition to the original polishing of new dies, there is the opening out to larger sizes of dies returned from the mills, and the removal of any surface imperfections or rings which have developed in the dies during use. Both diamond and tungsten carbide dies may be opened out many times to larger sizes, before they are finally discarded.

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Drawing Machines

THE single hole block consists of a de-coiler or swift, a drawing block or capstan, and a die held in a die-box. The single-hole blocks are used mainly for the larger sizes of wire, where lengths are comparatively short, for the earlier stages of reduction with some alloys and for alloys which are not capable of standing continuous reduction without intermediate annealings. In general, drawing speeds on the single-hole blocks are low.

★ ★ ★

THE continuous machines subdivide again into slip and non-

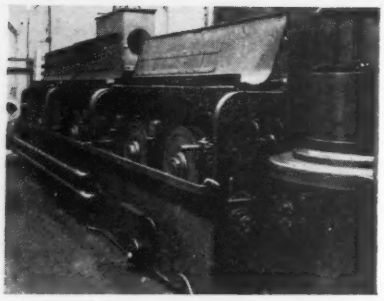

Fig. 3—Wire-drawing machine by Barron and Crowther.

slip types, and examples of both types will be found in the various mills. Continuous machines consist of a succession of drawing drums or cones, alternating with die holders. The successive drums are given increased peripheral speed through gearing combined, in certain types of machines, with increasing diameter of cones. (See Figures 3, 4, and Figure 5.) As the wire passes through the various dies it becomes elongated and the increased peripheral speeds are designed to absorb this increased length. This cannot be exactly compensated (without the use of special devices) owing to variation of die size, and so machines are arranged with a small amount of forward slip of the wire round the drums or cones. If this is allowed to become excessive, over-heating and grooving of the drums takes place. The lubricant and cooling medium is usually a type of sulphonated oil in water. On the non-slip type of machine, wire is allowed to accumulate on the various drums, and the die reductions can vary considerably owing to the reserve of wire which is built-up at each stage of the machine; lubrication is by soap flakes.

★ ★ ★

Copper Wire Mill

THIS department contains several machines which may be used for the breaking down of copper rod from 5/16 in. to various sizes between 18 s.w.g. and 10 s.w.g., or for finishing copper wire to the various power cable sizes. Most of these machines use 9-13 dies. From these machines the wire is supplied to a number of machines which are capable of finishing a range of sizes from 0.050 in. down to 0.012 in., the smaller sizes requiring two stages of reduction on the small machines. The finishing machines use from 15-17 dies. Drawing speeds vary up to 4,000 ft./min. In all cases, the dies and wire are completely immersed in lubricant.

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ANNEALING Plant includes Bates and Peard and dry pit type annealing units.

★ ★ ★

IN another section, pickling of the hot-rolled rod is carried out, and in this case, copper recovery by electro-deposition is done during the pickling operation. The pickle boshes are divided into two compartments by slatted wooden partitions, pickling being carried on in one portion, and electrodeposition of copper in the other. In addition to the recovery of copper, consumption of acid is reduced and the saving pays for the whole cost of the copper recovery.

★ ★ ★

IN the copper wire mill, there is a considerable production of tinned copper wire. The coils, after bright annealing, are placed in a weak acid bath from which the wire is passed through pads coated with a flux, and then through a bath of molten tin. After wiping through pads and cooling, the tinned wire passes to coilers. The

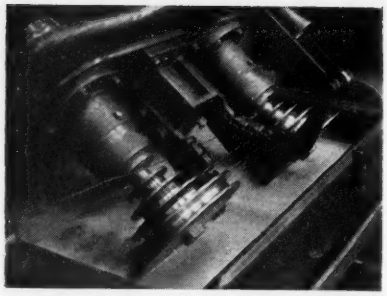

Fig. 5—Drawing 8 Wire in a Farmer Norton Machine.

greater part of the tinned wire output is used in connection with detonators for mining.

★ ★ ★

Brass Wire Mill

THIS mill which is in the course of complete modernization is used for brass and phosphor bronze wire from 12 to 30 s.w.g. The existing method, which is rapidly being superseded, uses as a starting point slit and welding rod, which, after a rounding up draw, is processed on continuous machines. Included in the Brass Wire Mill are four machines of the non-slip class. One is of a heavy type used for breaking down alloy rods from 5/16 in. diameter to 11 s.w.g. through seven dies. The other three non-slip machines are used for a second stage operation from 11 s.w.g. to 16 s.w.g., or sizes in this vicinity. Two of these latter machines have six dies, and the third has seven dies. These machines are used

(*Please turn to page* 246)

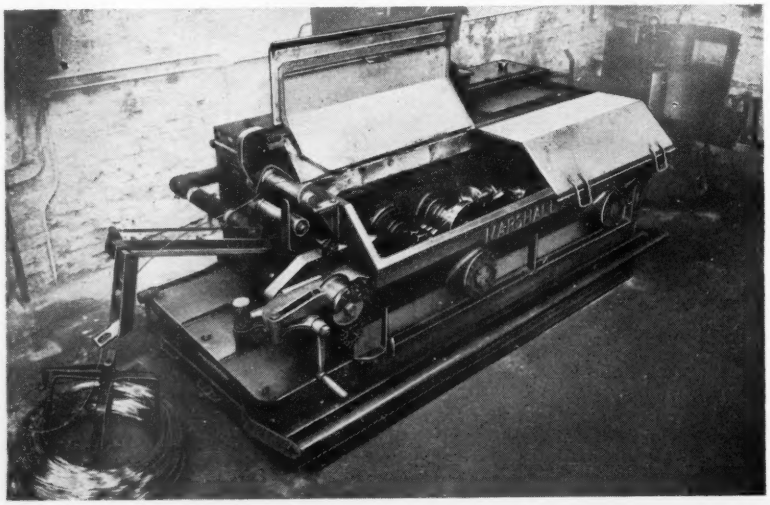

Fig. 4—Wire-drawing machine (Marshall-Richards).

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An Investigation Of The Weavability Of Wire With Observations On The Defects Of Wire And Wire Cloth

By Walston Chubb, Jr.

Perrysburg, Ohio

Part II

This study is the result of research work carried on at the Missouri School of Mines under the Ludlow-Saylor Company's research fellowship there, now in its third year. The objective is to enable suppliers to furnish better wire and wire cloth buyers to secure the highest quality of product. The first fellow was E. W. F. Funk, whose work is referred to by the author and from whose researches he benefited. The work was carried on under the direction of E. S. Epplesheimer, head of the Department of Mechanical Engineering. This paper is being published in four installments of which this is the second part.

Testing of Weaving Wire

Special Tests for Weaving Wire

OF all the tests that are applicable to wire, in the author's opinion only the tensile test, the kink test, the stiffness test, actual forming tests, the hardness test, chemical analysis, and metallographic examination are of any special use in the testing of weaving wire. The tensile test and the hardness test were described earlier. These two tests can show whether or not a wire sample has been made according to specifications and is uniform. Experience shows that certain combinations of elastic limit, tensile strength, and elongation as obtained from a tensile test result in superior workability; but these values give only an indirect measure of the workability of wire. Only the hardness test gives a good indication of variations in the workability along the length of a wire specimen, and this test is very difficult to perform on a round wire. The tensile test may sometimes completely overlook non-uniformities in wire, because the test always indicates the weakest point in the specimen.

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OF course, chemical analyses and metallographic examinations give only a rough indication of the properties of a wire; but when a wire has been badly worn, crimped, or woven, these tests may be very useful in estimating the physical properties of the wire. They are frequently used to substantiate the results of other physical tests.

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ACTUAL forming tests, such as crimping, naturally show whether or not the wire can be formed, but such tests produce no numerical values which indicate workability, and they give no indication of how much more strain the wire can stand. If a wire cloth is to undergo further forming operations, then lack of such knowledge may prove disastrous; the cloth may have become extremely sensitive to slight overloads, wear, or vibration.

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THE kink test is a manual test used by wire weavers and others to give them a rough idea of the workability, formability, or weavability of wire. The wire is looped and kinked or knotted and pulled taut; the feel of the wire during this operation and the appearance of the kink give the experienced worker a good idea as to whether or not it will weave properly on his machine. Such a test is a great aid to the artisan, but it produces no concrete values for the metallurgist.

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A STIFFNESS test is any test which measures the resistance of a material to bending forces. Such a test implies and requires that the specimen be bent only once during the test. The specimen may be bent either as a contilever beam fixed at one end and loaded at the other, or as a simple beam loaded in the center and supported at both ends. Such a bending test should be able to detect differences in "hardness" of cold drawn wire, differences in temper of tempered wire, and differences in structure and heat treatment of annealed wire; it should be able to detect all defects that materially affect the stiffness of wire; and it should disclose seams and laps and tears. Because plastic deformation usually occurs in the bending of a wire, the author believes that such a test gives an indication of the work hardening characteristics and toughness of a wire. The author believes that stiffness in the plastic range is a measure of workability of wire.

★ ★ ★

ACCORDING to the advertising literature of Tinius-Olsen Testing Machine Company, three stiffness testing machines manufactured by them have been used to measure the stiffness of textiles and paper products. Several other manufacturers advertise competitive models for the same purpose. They mention that these machines may be used for wire, and Tinius-Olsen has run successful stiffness tests on several samples of wire sent to them by the author. In an article on weaving wire in the October, 1942 issue of "Wire and Wire Products", Mr. L. D. Granger described how he used a simple stiffness tester to measure the uniformity of annealed wire,[11]. His test consisted of clamping one end of a wire sample in a small vise attached to a protractor; then the free end of the wire was bent through 180 degrees and released. The recovery of the wire was measured in degrees, and the uniformity of recovery was taken as a measure

of the uniformity of the wire. All of these stiffness testers operate on the cantilever beam principle, and most of them measure the bending force or moment required to gradually bend a wire to an angle of 90 or 180 degrees.

★ ★ ★

The Transverse-Crimp-Sensitivity Test

THE author has developed a stiffness test based upon the principle of a beam supported at both ends and loaded at the center. This test gives an especially good measure of weavability because the test closely approximates the effect of crimping upon wire, and it quantitatively measures the force required for crimping. The "transverse-crimp-sensitivity test" is essentially a refinement of the bend test for ductile materials,[30]. It is the outgrowth of a simple manual stiffness test used by workers at Ludlow-Saylor Wire Company as an aid in selecting uniform wire for weaving into cloth. This manual test consists of placing the wire sample across the second and fourth fingers of one hand. The thumb is then placed in the center of this span and the wire is bent. The apparent resistance to bending indicates stiffness or degree of "hardness of the wire. The variables in this test are (a) the length of wire held between the second and fourth fingers, (b) the depth of crimp placed in the wire, and (c) the sensitivity of the person performing the test. This third variable was eliminated immediately in the laboratory by using a tensile tester to measure the force applied during bending.

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THE length of the wire or "span" could have been set at any convenient value, but for purposes of mathematical analysis it was found desirable to set the span at some integral multiple of four times the diameter of the wire being tested. Wire may be crimped to almost any mesh, but the practical limit is reached when the cloth opening becomes somewhat less than the diameter of the wire. When the opening is exactly equal to the wire

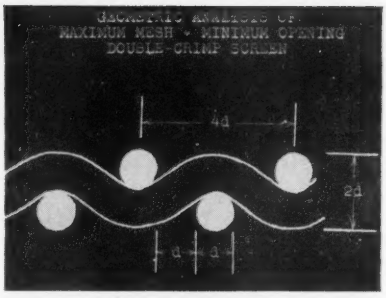

Figure 3A—Diagrammatic cross-section of a piece of double-crimp wire cloth showing the relation between the wire diameter and the screen opening.

diameter, then, referring to figure 3A, the span of a fill wire between two alternate warp wires is equal to four times the diameter of the wire. This, of course, is true only if the warp and fill are the same size and if there is no crushing. For the wire sizes tested up to this time, a span of eight times the wire diameter has been found to be convenient. This is just twice the unit span described above.

★ ★ ★

THE depth of the bend or crimp also could have been set at any convenient value, but it was thought desirable to approximate the heaviest or deepest crimp ever given to wire in the weaving industry. Referring to Figure 3A again, it is seen that the thickness of double-crimp cloth is twice the diameter of the wire, and the deflection of the wire in crimping is very nearly equal to the diameter of the wire (or one fourth of the span). This gives an angle of 127° in the vee of the crimp. Similarly, for straight-warp cloth, the thickness of the cloth is three times the diameter of the wire, and the deflection of the fill wires is equal to twice the diameter of the wire or one half of the span. This gives an angle of 90° in the vee of the crimp. Since this is probably the deepest crimp ever used, the depth of crimp for the laboratory test was set at one half the span or a 90° vee.

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THE apparatus for the test consists of a steel yoke and a tensile testing machine having a load range of zero to one hundred pounds. The tensile machine should have a loading rate of less than a half inch per minute and should be capable of starting and stopping quickly without appreciable inertia effects.

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THE yoke consists of two, rectangular, steel pillars, held apart by shims. When a test is to be performed on a certain size wire, the shims are adjusted to give the desired span between the two pillars, and then the whole device is bolted together with two bolts. Separate yokes could be used for each size of wire, but the yokes used in developing this test were merely adjusted every time a dif-

STEEL YOKE FOR

THE TRANSVERSE CRIMP SENSITIVITY TEST

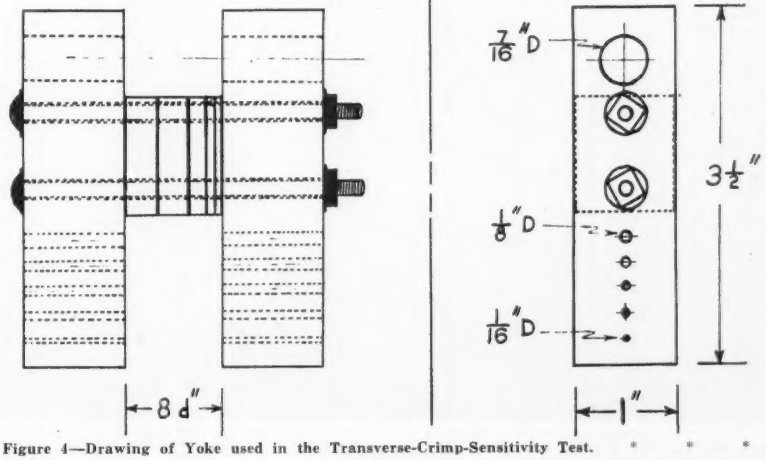

Figure 4—Drawing of Yoke used in the Transverse-Crimp-Sensitivity Test.

ferent size wire was to be tested. The device is shown in detail in figures 4 and 5. The large hole at the top is 7/16 inch in diameter. A 3/8 inch rod is passed through this hole and through a loop of heavy wire suspended from the upper jaw of the tensile machine. The next two holes are 3/16 inch holes for the two bolts which pass through the pillars and shims and hold the pillars together. The bottom five holes in the pillars are the holes through which the wire specimens are passed. These holes are 1/8 inch, 7/64 inch, 3/32 inch, 5/64 inch, and 1/16 inch in diameter.

★ ★ ★

IN performing this test a fourth variable factor was encountered; it was found that the size of the hole into which the wire was placed had a noticeable effect upon the loads obtained. The larger the hole, the smaller the final load. In order to find some basis for fixing the size of the hole into which a certain size of wire would be placed, an attempt was made to analyze the conditions occurring in an actual crimping operation. Referring to figure 6, which is dimensioned according to the conditions described for figure 3A, it is apparent that there can be little or no motion of the crimped wire back toward tooth, "4", where the maximum crimp is given to the wire. However, during the first bending process between teeth, "2" and "3", it would seem that slipping of the wire over teeth, "1" and "2", might occur. Therefore, in the transverse-crimp-sensitivity test, the friction between the wire and the yoke should be practically nil at the start and as great as possible at the end. It is hoped that this condition is approximated by making the holes as small as possible and very, very long compared to the wire diameter. For speed of manipulation of the wire samples and to reduce the erratic effect of frictional forces, it was found desirable to test a particular size of wire in a hole about 0.02 inch larger than the wire. If a smaller hole is used, then frictional resistance becomes a large part of the load measured, and the stiffness of the wire will not be accurately measured. If the wire is badly bent or kinked, then frictional forces may have a controlling effect upon the results. If a larger hole is used, then the effective length of the span is increased, and it becomes an unknown instead of a known factor.

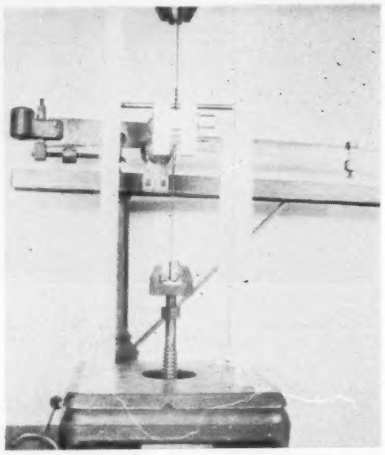

Figure 5—Tensile Machine and Yoke showing how a Wire Specimen is Crimped in a Transverse-Crimp-Sensitivity Test.

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THE testing procedure involves adjusting the shims to give a span between the pillars of eight times the wire diameter. The device is then suspended from the upper jaw of the tensile machine, and a zero adjustment or reading is made on the tensile machine. A straight wire specimen, two or three inches long is then inserted through the proper holes in the pillars, 12 gage (Washburn and Moen) wire is tested in the 1/8 inch hole; 13 gage wire is tested in the 7/64 inch hole; 14 and 15 gage wires are tested in the 3/32 inch hole; 16 and 17 gage wires are tested in the 5/64 inch hole; and 18 gage wire is tested in the 1/16 inch hole. Wires as light as 23 gage have been examined with this apparatus using the 1/16 inch hole. When the wire is properly supported by both pillars, a loop of wire of the same gage as the specimen is looped over the center of the specimen, and the ends of the loop are secured in the lower jaw of the tensile machine. Load is then slowly applied to the specimen until the center of the specimen has been deflected a distance equal to four times the diameter of the wire. This produces a 90 degree bend in the specimen. The maximum load applied up to this point is the value of crimp-sensitivity desired. This value in pounds is a measure of the degree of cold working and/or subsequent heat treatment that wires of the same size and analysis have received. It is a good measure of the workability of the wire.

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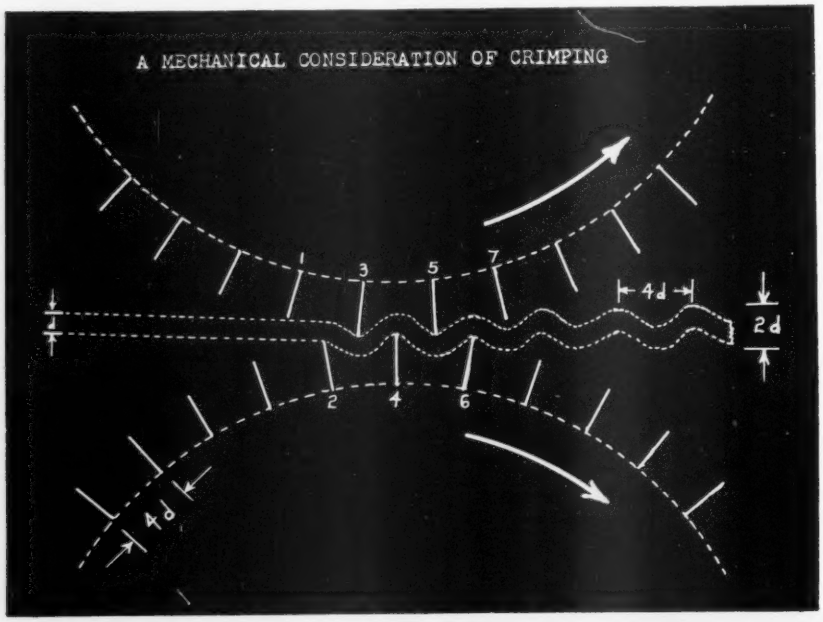

Figure 6—Diagram showing how wire is crimped.

USING the equation for elastic deflection of a beam loaded at its mid-point, (31), and inserting the constants for this test and an empirical factor (k/1000) to take care of plastic deformation, the following relation is obtained:

$P=(3/256)(k/1000)(3.1416)\ E\ D^2$

or for steel:

$$P=1105\ k\ D^2$$

where P is the load at the end point of the test in pounds, E is Young's modulus, D is the diameter of the wire in inches, and k is a factor related to a secant modulus, (32).

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THESE equations show that if steel wires of similar analysis and heat treatment and structure are subjected to this test, and if the end-point loads are plotted against the square of the wire diameters, then a straight line should result. Figure 7 shows how nearly this is true for common-annealed steel wire from one manufacturer. As used in the above equations, k is a plastic flow factor and is numerically equal to the slope of the line plotted in figure 7 divided by 1105. From figure 7, k for common-annealed wire was found to have a value of 9.8 plus or minus ten percent. Variations from this value of k greater than ten percent are believed to make common-annealed wire unsuitable for production of first quality wire cloth; variations of as much as eighty percent have been found in rejected coils of supposedly full-annealed wire.

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"HARD" wires have high "k" values, and "soft" wires have low "k" values. It follows, therefore, that k is a true measure of stiffness, workability, and weavability. Such a factor makes possible the comparison of two different pieces of wire with respect to their ease of fabrication. For wires of the same analysis, such a factor can be used to reveal small variations in the amount of heat treatment that a wire has received. In practice, of course, for any given size of wire it is not necessary to calculate k, since the values of P obtained from the test are directly proportional to k.

★ ★ ★

THE mathematical analysis of this test depends upon the fact that the span of wire between the pillars and the deflection of the beam during the test are multiples of the diameter of the wire tested.

★ ★ ★

THE conditions under which this test is performed have some small effect upon the results and every effort should be made to standardize the testing procedure. It should be noted that the friction between the wire specimen and the yoke will vary slightly depending upon the material of the yoke and the condition of the working surfaces. The size of the hole used in testing a certain size of wire is especially critical; but if the author's procedure is followed, or if the size of hole is maintained constant for all wires of the same nominal size, then satisfactory results should be obtained. The values of crimp-sensitivity, P, obtained from the test are naturally dependent upon the composition of the wire, and this factor should not be overlooked when comparing wires of different materials. All wire specimens should, of course, be straight.

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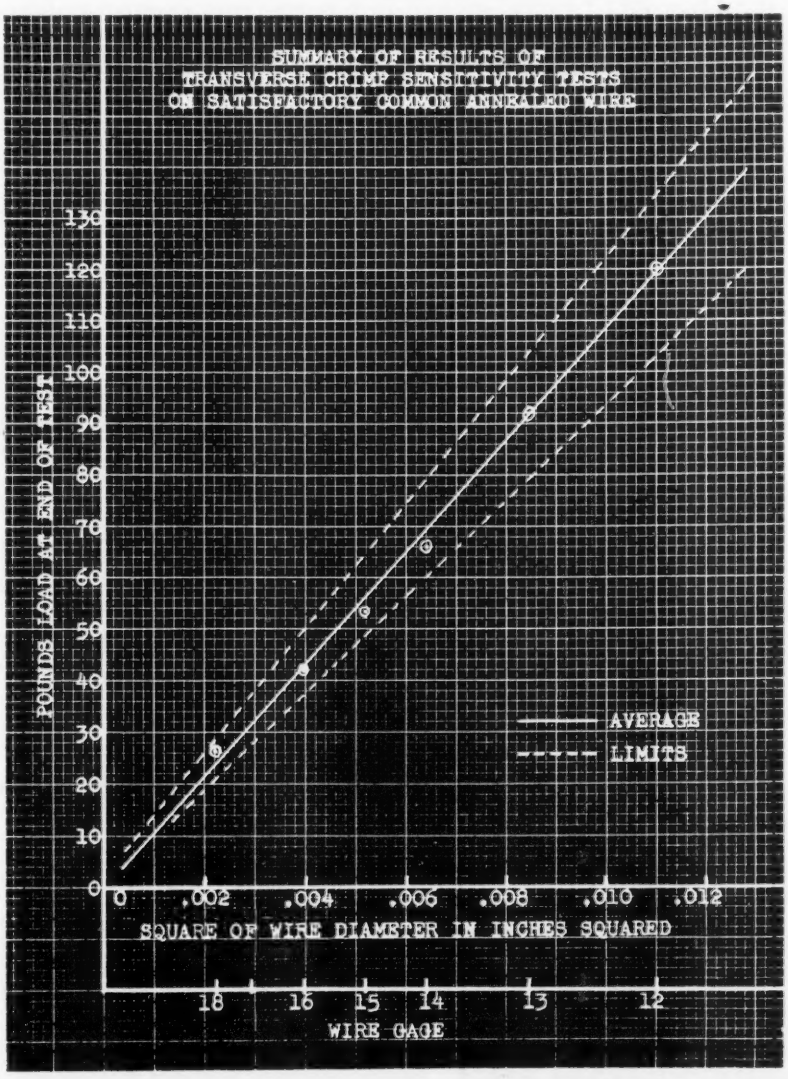

Figure 7—Plot of transverse-crimp-sensitivity test results showing adherence to theoretical equation for plastic deformation.

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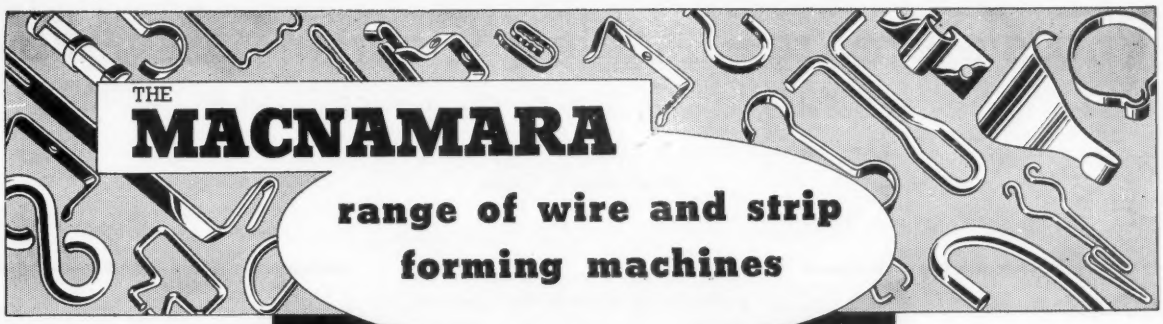

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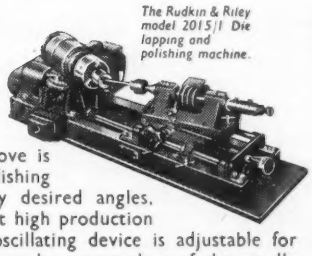

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The model 2015/1 shown above is a high speed lapping and polishing machine which produces any desired angles, bores or radii automatically at high production rate. The unique positive oscillating device is adjustable for pressure, and the headstock can be swung clear of the needle spindle for inspection and hand polishing. The machine has a high rate of carbide removal, and adjustments can quickly be made to cover every operation on wire, rod and tube drawing dies.

THE BRITISH TOOL, MACHINE TOOL AND SCIENTIFIC INSTRUMENT SECTION, CANADIAN INTERNATIONAL TRADE FAIR TORONTO 29 MAY – 9 JUNE 1950

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Phosnic Bronze—A New Copper-Base Alloy

by Donald K. Crampton, Ph.D., Director of Research
Chase Brass & Copper Co., Incorporated
Waterbury, Conn.

New metals offer fabricators opportunity to make better products, which in turn give the ultimate consumer greater values. The new alloy described herein is one of those laboratory developments that appears to have unique qualities worthy of consideration.

PHOSNIC Bronze is a relatively new copper-base alloy developed in the research laboratories of **Chase Brass & Copper Company,** at Waterbury. It was discovered during a general investigation of the effect of certain alloying elements on working characteristics and physical properties of copper. Early in the investigation there were indications that some combination of nickel and phosphorus added to copper and subjected to a certain controlled sequence of working and heat treatments would result in a combination of properties which was unique.

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PURE copper is a soft, very ductile material capable of being cold worked severely in various ways. During such working it hardens at a substantial but not outstanding rate. It has long been known that many other metals added to copper greatly increase the natural hardness and also substantially increase the rate of work hardening when the alloys are rolled, drawn, hammered, or otherwise severely deformed at ordinary room temperature.

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THE electrical conductivity of pure soft copper is the highest of any commercial metal except silver, and this conductivity is reduced only slightly by severe cold working. Unfortunately, almost without exception the elements which are most effective in increasing the hardness and strength of copper have an extremely adverse effect on the electrical conductivity. For many uses, this is of no consequence, but in the many applications where high strength, hardness or stiffness, together with a high conductivity is desirable, such alloys cannot be tolerated. The thing which attracted the Chase research engineers originally was the fact that under certain conditions alloys of copper, nickel and phosphorus were found to have a better combination of the mechanical properties and electrical properties than the usual copper alloys.

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AFTER this general picture was established, more detailed investigation of the exact effect of differing amounts of nickel and phosphorus individually and in combination was undertaken. Many alloys were made up experimentally, covering a wide range of composition, and for each alloy many combinations of mechanical and thermal treatments were applied. As a result of all this work it was found that when the ratio of nickel content to phosphorus content was approximately 5 to 1, and when the total of these two elements was in the general range of 1 to 1.5% with the balance copper, the optimum combination of properties resulted. This is the alloy which ultimately was named Phosnic Bronze, the name being coined from the words phosphorus and nickel and the term bronze indicating that these are present in a copper base.

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THE most desirable combination of properties is not automatically developed in this alloy but requires strict control of the fabricating operations. The alloy is what metallurgists call an age-hardening ore. The nickel and phosphorus combine to form a compound, known as nickel phosphide, which completely dissolves in solid copper at high temperatures but normally comes out of solution at lower temperatures.

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IN the condition where nickel phosphide is in solution, the alloy is relatively soft and the electrical conductivity only about 32% of that of pure copper. This condition, which normally occurs only at high temperature, can be retained at room temperature by the simple expedient of heating to around 1400°F and quenching very rapidly in water. Then in order to harden the material, it is necessary to reheat to an intermediate temperature of about 850°F for about ½ hour. During this heating the nickel phosphide is thrown out of the solid solution in the form of extremely fine particles disseminated throughout the mass. This causes a very substantial increase in tensile strength, hardness and stiffness. Concurrently the electrical conductivity increases to about 60% of that of pure copper.

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NOT only are the properties very greatly improved by this simple aging or precipitation treatment but even in that condition the alloy is still extremely tough and capable of withstanding very severe cold work. This means that the strength and hardness, although substantially greater than found in copper, can be still further increased, and depending on the degree of such drawing, a series of combinations of strength and conductivity are obtained, desirable for many individual applications.

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The accompanying charts give the various properties of Phosnic Bronze in further elucidation of the text.

TABLE ONE

TABLE OF PHYSICAL PROPERTIES

	English Units	C.G.S. Units
Density	0.323 lb. per cu. in.	8.94 gm. per cu. cm.
Melting Point — Liquidus	1975°F.	1080°C.
Melting Point — Solidus	1900°F.	1040°C.
Coefficient of Thermal Expansion	0.0000098 per °F. from 77°F. to 572°F.	0.0000177 per °C. from 25°C. to 300°C.
Thermal Capacity (Specific Heat)	0.092 Btu/lb./°F. at 68°F.	0.092 cal./ gm./°C. at 20°C.
Modulus of Elasticity (Tension)	17,000,000-19,000,000 psi	12,000-13,500 kg./sq. mm.
Electrical Conductivity / Thermal Conductivity	See Table 4.	

TABLE TWO

TABLE OF MECHANICAL PROPERTIES

Size Section	Temper	Tensile Strength	Yield Strength (½% Extension under Load)	Yield Strength (0.2% Offset)	Elongation in 2"	Rockwell Hardness	Endurance Strength	Endurance Strength Million Cycles
		psi	psi	psi	%	B	psi	
Round Wire 0.080 in.	Soft	38,000	.....	10,000	40	..	.....	...
	Age-Hardened	65,000	.....	40,000	25	..	.....	...
	Quarter Hard	80,000	.....	67,000	13	..	.....	...
	Half Hard	88,000	.....	78,000	8	..	20,000*	100
	Hard	97,000	.....	85,000	5	..	23,000*	100
	Extra Hard	105,000	.....	92,000	4	..	33,000*	100
	Spring	110,000	.....	97,000	4	..	36,000*	100
	Extra Spring	115,000	.....	101,000	3	..	38,000*	100
	Special Spring	120,000	.....	105,000	3	..	39,000*	100
Flat Wire 0.032 in.	Soft	38,000	.....	10,000	40	..	.....	...
	Age-Hardened	65,000	.....	40,000	25	72	.....	...
	Quarter Hard	71,000	.....	62,000	8	79	.....	...
	Half Hard	76,000	.....	70,000	4	83	.....	...
	Hard	84,000	.....	77.000	3	88	.....	...
	Extra Hard	90,000	.....	82,000	3	91	.....	...
	Spring	95,000	.....	86,000	3	93	.....	...
	Special Spring	105,000	.....	95,000	2	95	22,000	100
Rod 1¼ in.	Soft	38,000	.....	.....	50	..	.....	...
	Age-Hardened Only	65,000	40,000	.....	35	72	.....	...
	Drawn and Age-Hardened	85,000	68,000	.....	15	85	.....	...

*Tests on straightened wire.

The above properties are ones which might be expected in commercial practice and from which variations must be expected. They are not to be used as minimum specification requirements.

TABLE THREE

TABLE OF ELECTRICAL AND THERMAL PROPERTIES

Size Section	Temper	Elec. Cond. % IACS	Electrical Resistivity ohms (mil. ft.) at 68°F.	Thermal Conductivity Btu/sq. ft./ft./hr/°F. at 68°F.	Thermal Conductivity Cal./sq.cm./cm./sec./°C. at 20°C.
Round Wire 0.080 in.	Soft	32	32.5	80	0.33
	Age-Hardened	60	17.3	145	0.60
	Quarter Hard	60	17.3	145	0.60
	Half Hard	60	17.3	145	0.60
	Hard	59	17.6	143	0.59
	Extra Hard	57	18.2	138	0.57
	Spring	55	18.9	133	0.55
	Extra Spring	52	20.0	126	0.52
	Special Spring	50	20.8	121	0.50
Flat Wire 0.032 in.	Soft	32	32.5	80	0.33
	Age-Hardened	60	17.3	145	0.60
	Quarter Hard	60	17.3	145	0.60
	Half Hard	60	17.3	145	0.60
	Hard	60	17.3	145	0.60
	Extra Hard	59	17.6	143	0.59
	Spring	57	18.2	138	0.57
	Special Spring	55	18.9	133	0.55

The above properties are ones which might be expected in commercial practice and from which variations must be expected. They are not to be used as minimum specification requirements.

(See next page for tables four and five)

IN addition to the ordinary mechanical and conductivity properties already discussed, another very unusual thing was found with the Phosnic Bronze. This has to do with fatigue strength, or the ability to withstand repeated applications of high stress. The fatigue strength ordinarily expressed as pounds per square inch of cross section which will give a life of 100,000,000 applications of stress is only average for copper alloys at drawn tempers up to what is ordinarily called half hard or hard. The half hard temper equivalent to a 37% reduction of area by drawing is 20,000 p.s.i. The surprising thing is that with a little further cold drawing to what is known as extra hard temper, equivalent to a 75% reduction in area and for higher reductions, a surprising increase in endurance strength results, these values ranging from 33,000 p.s.i. for extra hard to 39,000 p.s.i. for

TABLE FOUR

TABLE OF ENDURANCE DATA ON PHOSNIC BRONZE ROUND AND ROLLED FLAT WIRE

Form	Temper	Stress (psi) to Produce Failure in Number of Reversals Indicated. 500,000	1,000,000	2,000,000	5,000,000	100,000,000
Flat Wire	Special Spring (12 Nos.)	37,000	33,000	28,500	23,500	22,000
Round Wire	Extra Hard (6 Nos.)	45,500	42,000	39,000	34,500	33,000
Round Wire	Special Spring (12 Nos.)	49,000	44,000	39,000	39,000	39,000

The above properties are ones which might be expected in commercial practice and from which variations must be expected. They are not to be used as minimum specification requirements.

TABLE FIVE

TABLE OF TYPICAL PROPERTIES OF ROUND, SPRING TEMPER WIRE OF PHOSNIC BRONZE AND OF OTHER COPPER ALLOYS

(As Straightened after Drawing)

Alloy	Tensile Strength* psi	Modulus of Elasticity psi	Stress (psi) at Designated Offset 0.01%	0.02%	0.05%	0.10%	0.20%	Endurance Limit psi	Electrical Conductivity % IACS at 68°F.
Phosnic Bronze	120,000	19,000,000	58,000	68,000	82,000	89,000	95,000	39,000	50
Phosphor Bronze 5% (A)	130,000	16,000,000	76,000	86,000	95,000	100,000	110,000	30,000	14
High-Silicon Bronze (A)	140,000	15,000,000	35,000	45,000	65,000	75,000	100,000	29,000	7
Cartridge Brass, 70%	120,000	15,000,000	38,000	47,000	62,000	74,000	88,000	22,000	25

*Tensile strength of severely drawn wire is slightly lowered by the mechanical straightening operation.

The above properties are ones which might be expected in commercial practice and from which variations must be expected. They are not to be used as minimum specification requirements.

special spring temper. Thus for applications where high strength and hardness, spring properties, high endurance strength, etc., together with high conductivity are required, the Phosnic Bronze offers a most unusual combination of these and one which is not matched by other commercial alloys.

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A DESIRABLE characteristic of spring and bolt material is high resistance to creep or flow under the influence of prolonged stress. Our laboratory tests have shown that Phosnic Bronze, as age-hardened, has much greater creep strength at 80°F. than have annealed alloys such as cartridge brass 70% phosphor bronze, 5% (A) and high-silicon bronze (A). The effect of subsequent cold working is to diminish this difference, due to the greater rate of work hardening of the latter alloys, so that the several creep strengths for spring temper are of the same general magnitude for this temperature. At elevated temperatures, 300° - 500°F., the creep strength of Phosnic Bronze is particularly good and greatly exceeds that for the three comparison alloys mentioned above.

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AS is the case for other materials, Phosnic Bronze should be used carefully at elevated temperatures. In the age-hardened state, high stress concentrations should be avoided at 300°F. and 400°F., and prolonged exposure under stress at 500°F. should be avoided altogether because of the development of brittleness under such conditions. As severely cold worked after age-hardening, Phosnic Bronze appears much more stable at elevated temperatures. Tests made upon Phosnic Bronze in such a temper after it had been subjected to creep tests at 500°F. showed that virtually no physical deterioration, apart from slight softening, had occurred.

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CLOSELY related to the phenomenon of creep is that of relaxation, involving decrease of stress under the influence of prolonged, constant strain. Such a service condition is encountered by bolts and some spring members. Laboratory tests which we have made at 80°F. indicate that the relaxation resistance of Phosnic Bronze in hard drawn tempers is essentially the same as for phosphor bronze, 5% (A) and high-silicon bronze in corresponding tempers and is superior to that of cartridge brass, 70%. At higher temperatures, a general superiority of Phosnic Bronze would be expected.

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IT is well known that the stress-strain relationships of the above three commonly used alloys are not truly proportional over the ranges of stress in which they are very properly used. This fact makes it practically impossible to establish definitely a true elastic limit or a value for modulus of elasticity which is valid over a wide range of stress. Phosnic Bronze is no exception with regard to this type of relationship. The initial stages of tensile stress-strain curves for cold worked metal are usually found to be most nearly linear for phosphor bronze, 5% (A) with Phosnic Bronze next in order.

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TYPICAL offsets or deviations from the initial modulus line for this group of alloys in the form of straightened round wire, spring temper, are listed in Table 5. These values provide a ready means of comparison of stress-strain characteristics and apparent elasticity of the various materials. Indeed, they may be used in conjunction with modulus values to draw typical stress-strain curves.

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(*Please turn to page* 242)

Be Sure to be in Peoria May 11 and 12

for the

Mid-West Regional Meeting of the Wire Association

At the Pere Marquette Hotel, Peoria, Ill.

Program Chairman: John A. Moritz, Supt. Wire Mills,
Keystone Steel and Wire Co., Peoria, Ill.

THE PROGRAM

THURSDAY, MAY 11, 1950—Chairman of Meeting: Curtis Voightlander, Union Wire Rope Corp.

2 P.M.—PAPER: CARBIDE WIRE DRAWING DIES—BEARINGS vs. NO BEARINGS, by Jack Tompkins, Chief Chemist, Keystone Steel & Wire Co. This paper is the result of six months of experimentation on the subject in Keystone's plant.

3 P.M.—PAPER: APPLICATION AND USE OF LUBRICANT COATINGS, by Floyd M. Hauger, vice pres., Standard Industrial Compounds Co. The author discusses a revclutionary method in the application of wire and metal drawing lubricants.

6:30 to 7 P.M.—COCKTAILS—Courtesy of Standard Industrial Compounds Co.

7 P.M.—BANQUET in La Salle Room of Pere Marquette Hotel.

SPEAKER—The Hon. Everett M. Dirksen, Ex-Congressman from the 16th District, Illinois. In Washington, Mr. Dirksen was considered among the top three speakers in the House. Is now running for U. S. Senator from Illinois—a very able and forceful speaker, well-worth hearing.

FRIDAY, MAY 12, 1950—Chairman of the Meeting: Ralph B. Roth, Vice Pres., Ludlow Saylor Wire Co.

9:00 A.M.—PAPER: ALUMINUM WIRE, by C. J. Beneke, Mgr., Reynolds Metal Co., Louisville, Ky. The paper will dwell on various aluminum wire drawing problems and the uses and applications of aluminum wire.

10:15 A.M.—Buses will leave the hotel for the Keystone plant.

10:30 A.M.—GENERAL PLANT VISIT through Keystone Steel and Wire Company's wire mills.

12:45 P.M.—Luncheon in Keystone's ultra-modern cafeteria as guests of the Keystone Steel and Wire Company's Management, followed by round table discussions. This will conclude the Regional Meeting.

REGISTRATION FEE: A fee of $6.00 will be charged for each person, which will include the Banquet and the trip to the Keystone plant and return.

The Program Chairman, the Meeting Chairmen and the speakers are to be congratulated for their joint efforts in arranging what is considered one of the finest Regional meetings for your benefit. You are cordially invited to attend and we urge you to make immediate arrangements to be present.

Please make your hotel room reservations at once through this office.

THE WIRE ASSOCIATION

RICHARD E. BROWN, Executive Secretary

300 MAIN STREET STAMFORD, CONN.

GOVERNMENT WIRE PRODUCTION INFORMATION

Revision of Insect Wire Screening Commercial Standard CS138-47

As declared effective as of Dec. 28, 1949 by the Standing Committee.

1. Purpose

1.1 THE purpose of this commercial standard is to provide a nationally recognized standard of quality of insect wire screening. It will assist ultimate consumers in determining what sizes and types of insect wire screening are standard with the industry; and to promote fair marketing practices and a better understanding between manufacturers, distributors, and consumers of insect wire screening.

★ ★ ★

2. Scope

2.1 THIS standard describes the nomenclature, definitions and general requirements for commercial standard insect wire screening designed and woven primarily for installation in or on, any dwelling, building, or structure, for the purpose of preventing the ingress of flies, mosquitos, or other insects. A recommended form for guaranteeing compliance with this standard is included.

★ ★ ★

3. Definitions

3.1 INSECT WIRE SCREENING.—16 x 16, 18 x 14, and 18 x 18 mesh woven wire screening (carbon steel, commercial bronze, and aluminum), for protection against mosquitoes as well as flies and larger insects. (See par. 5.1)

★ ★ ★

3.2 GALVANIZED STEEL WIRE SCREENING.—16 x 16, 18 x 14, and 18 x 18 mesh carbon steel insect wire screening for protection against mosquitoes as well as flies and larger insects. (See par. 5.1) The metal used for the coating shall be zinc of at least 98 per cent purity, and the thickness (by weight) of the zinc coating shall be equivalent to at least 5% of the weight of the bare steel wire used in weaving the screening.

★ ★ ★

3.3 BRONZE SCREENING.—16 x 16, 18 x 14, and 18 x 18 mesh "commercial bronze" insect wire screening for protection against mosquitoes as well as flies and larger insects; woven from wire containing 89 to 94 per cent of

Table 1.—Standard Insect Wire Screening

Metal	Mesh			Diameter of wire Inches	Finish
Steel	16x16	18x14	18x18	0.011	Galvanized.
Commercial bronze	16x16	18x14	18x18	.011	Bright or antique (dark).
Aluminum	16x16	18x14	18x18	.013	Natural or dark.

MICROMETER PRECISION — MICRO-WELD — TRADE MARK REGISTERED

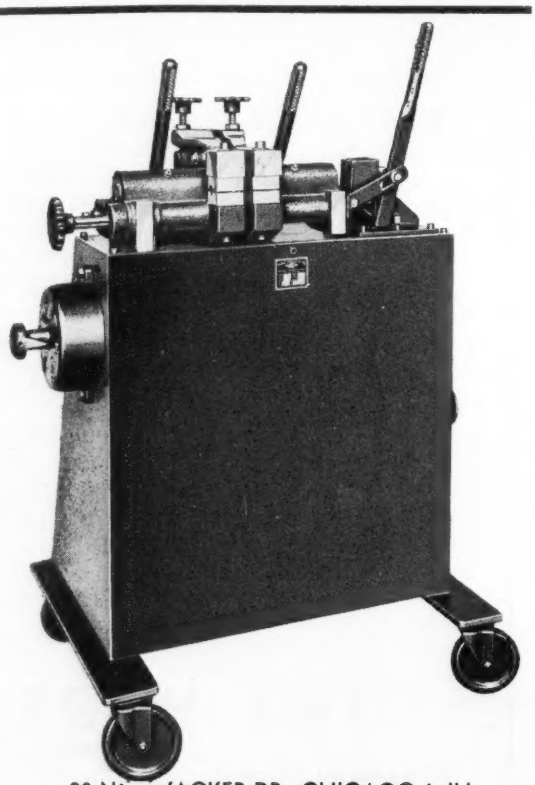
MODEL H-T MICRO-WELD HEAVY BUTT WELDER

A general utility Butt welder for welding Steel (low carbon rods and wire ranging in size from 1/8" to 7/8" diameter.

While this unit was not designed for production line work, the wide range in welding capacity makes it suitable for various types of welding requirements.

Equipped with hand-operated toggle type clamping mechanism, providing positive clamping of the stock. Spring actuated movable welding headpiece and close coupling of the transformer provides high efficiency on the welding current.

General construction of this unit is rugged to resist high upsetting forces, and to maintain accurate alignment of the work. Furnished mounted on 4-wheel truck as illustrated.



MICRO PRODUCTS CO.,

20 NO. WACKER DR., CHICAGO 6, ILL.
Telephone: STATE 2-7468

copper and the remainder zinc; lead or iron occurring as impurities shall not exceed 0.05 per cent each. (See par. 5.1)

* * *

3.4 **ALUMINUM SCREENING.**—16 x 16, 18 x 14, and 18 x 18 mesh aluminum insect wire screening for protection against mosquitoes as well as flies and larger insects; woven from aluminum alloy wire equal to, or demonstrably better for the purpose than what is known in the trade as 56S-H392 cladded aluminum alloy wire having a minimum tensile strength of 50,000 pounds per square inch.

* * *

3.5 **MESH.**—Mesh is the width of one opening plus the thickness of one wire; alternatively considered as being the distance from the center of one wire to the center of the next adjacent wire. The technical designation of the mesh count of insect wire screening is the number of meshes per linear inch, counted in the direction of both the warp and the filler wires. When used as a common designation of the "mesh size" of insect wire screening, the word "mesh" is generally accepted as meaning the number of open spaces per linear inch in both warp and filler directions.

* * *

4. Material and Workmanship

4.1 **ALL** standard wire screening shall be made of high-grade materials and with good workmanship. It shall be free from any defects that might affect its serviceability or its appearance. Well-made splices not over one inch long and showing no tails are permissible at any point of any individual wire, provided, however, that the number of splices shall not exceed 30 in any stock roll nor two splices in any 1 square foot of finished screening.

* * *

5. General Specifications

5.1 **MESH AND WIRE SIZE.**—The mesh counts, sizes

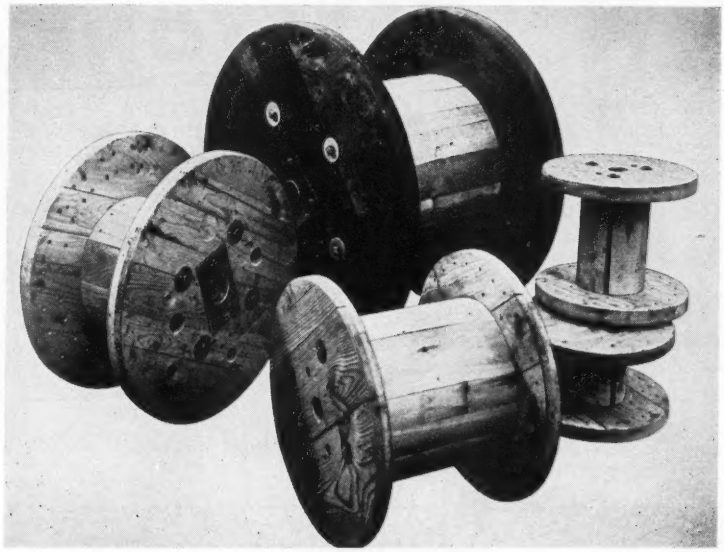
WOOD REELS

RETURNABLE and NON-RETURNABLE

for **CABLE**

ROPE and

WIRE



BRIDGE SHIPPING and SHOP REELS are furnished assembled or knocked-down, made to your specifications. Built to withstand severest handling. Sturdy, strong, low in cost.

ANY SIZE, FROM 12" to 96" in DIAMETER

ALSO, REEL HEADS FOR STEEL DRUMS

The streamlined production methods that give you reels of the finest possible construction at so low a cost, are matched by a unique distribution service that gets them to your plant fast.

BRIDGE trucks will deliver reels to your door within a radius of 200 miles. Fast N.Y.C.R.R. service will get reels to points as far away as St. Louis in three days time.

Use **BRIDGE** reels for quality and for speedy service.

Send us your specifications and let us quote on costs.

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HAZARDVILLE • CONNECTICUT

Keystone's new Galvanized MB Wire offers improved corrosion resistance. It gives added life and strength to mechanical springs subject to rust and corrosion. This is due to Keystone's unique method of galvanizing the wire **before** it is cold-drawn. The drawing process smooths and hardens the galvanized finish, increasing its lasting qualities remarkably. Other advantages are its lustre-bright, shiny smooth finish . . . even, uniform temper . . . and high tensile strength.

Keystone is prepared to help solve any of your industrial wire problems. If special treatment is called for, Keystone's metallurgical research and testing facilities are available to supply the answers. We welcome your inquiry.

KEYSTONE
STEEL & WIRE CO.
PEORIA . . . ILLINOIS

Special Analysis Wire, Setting New Standards of Performance

and kinds of wire, and types or character of finishes for standard insect wire screening shall be as shown in Table 1.

* * *

5.2 **WIDTHS.**—The stock widths of all types of standard insect wire screening shall be 24, 26, 28, 30, 32, 36, 42, 48 inches.

* * *

5.2.1 WIDTHS other than those set forth above in 5.2, when made to special order, may be labeled "standard" provided they conform with all requirements for mesh size, wire size, and kind of metal, as elsewhere set forth in this commercial standard.

* * *

5.3 **ROLL LENGTH.**—All standard stock rolls of insect wire screening shall be 100 linear feet in length; shall contain not more than two pieces per roll, and no piece shall be less than 10 linear feet in length.

* * *

5.4 **MESH COUNT.**—Accuracy of mesh count in the direction of the warp or filler wires shall be determined by counting the mesh openings for any interval of one continuous linear foot and dividing the result by 12.

* * *

5.5 **Wire Diameter.**

5.5.1 ACCURACY of the wire diameter of steel insect wire screening shall be determined by computing the average of the measured diameter of not less than 10 warp wires together with the same number of filler wires, taken at random from the finished screening, but with all coating or surface finish (if any) entirely removed.

* * *

5.5.2 IN commercial bronze and aluminum insect wire screening the same diameter of wire shall be used for both the warp and the filler, and accuracy of the wire diameter shall be determined by computing separately

(*Please turn to page 256*)

Outstanding Personalities of the Wire Industry

Martin H. Crego Retires After 57 Years' Service With Phelps Dodge

MARTIN H. CREGO, for the past 19 years manager of sales for **Phelps Dodge Corporation,** after 57 years' service with the company, retired on January 1st. Mr. Crego joined the company as a boy of 15 on June 1, 1892 and, altogether has been connected with the company's sales department for 40 years. His position with Phelps Dodge was his first and only employment.

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THE occasion of Mr. Crego's impending retirement was marked recently by a luncheon tendered in his honor, at which Robert G. Page, president of Phelps Dodge Corporation, acted as host and toastmaster.

★ ★ ★

S. G. Harris Joins Magnus

THE MAGNUS CHEMICAL CO., INC., Garwood, New Jersey, manufacturers of industrial cleaning compounds, announces that **Sidney G. Harris** has joined the Company in the capacity of Sales Engineer.

★ ★ ★

MR. HARRIS, who received his engineering and marketing education at Polytechnic Institute of Brooklyn and Columbia University, is well known throughout the automotive engineering field. He is a member of the Society of Automotive Engineers, American Society of Lubrication Engineers and Society of American Military Engineers.

★ ★ ★

A LIEUTENANT-COLONEL in the United States Air Force Reserve, Mr. Harris received the Army Commendation Ribbon for services during World War II. He recently graduated from the Air Command and Staff School.

★ ★ ★

BEFORE joining Magnus, Mr. Harris was associated with a nationally-known chemical firm as Manager of Sales-Engineering.

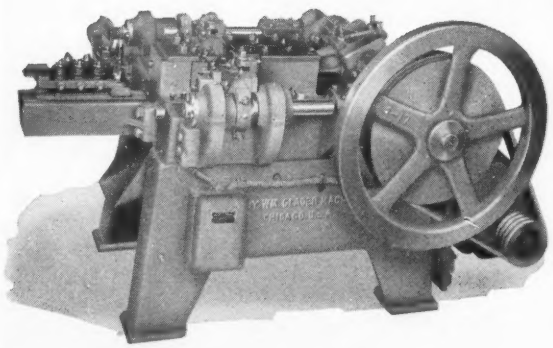
★ ★ ★

Link-Belt Co. Appointments

EUGENE P. BERG, formerly general superintendent, has been appointed to the newly created position of assistant general manager of the Pershing Rd. plant, Chicago, of **Link-Belt Co.,** Milwaukee. He had been general superintendent of the plant, a position he has held since 1947. **Richard Moyer,** formerly superintendent of the steel shop, was named general superindent, manufacturing department.

★ ★ ★

GLADER HIGH SPEED WIRE NAIL MACHINE



MACHINE ARRANGED FOR INDIVIDUAL MOTOR DRIVE

High tonnage output, and low maintenance costs, have resulted in Glader Machines being accepted as standard equipment in every large nail mill built in the United States in the past twenty years.

Glader Machines are operating in most of the wire producing mills throughout the world.

These machines are made in eleven different types and sizes. This enables us to cover the range of sizes of nails produced with the greatest efficiency.

For further information please address,

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Chicago 7, Illinois

Export Dept.: 122 E. 42nd Street, New York 17, N. Y.

John Menz Made Product Manager for Kaiser at Newark

A SPECIALIZED department for the sale of Kaiser Aluminum rod, bar and non-electrical wire products headed by John Menz as product manager is being established by **Kaiser Aluminum & Chemical Sales, Inc.**

★ ★ ★

THIS follows the expansion in the number and type of products produced at the Newark, Ohio, plant of Kaiser Aluminum & Chemical Corporation. Sales for these products will be directed from the Newark works, to which the electrical conductor sales office was moved recently.

★ ★ ★

REDRAW rod and round-drawn wire are being produced in a range of alloys on new equipment installed by Kaiser Aluminum in the Newark plant. Other rod and wire products will be added in the future.

★ ★ ★

Hart Retires as President Of Chase Brass and Copper; Succeeded by Coe

THE retirement of **Charles E. Hart,** 65, as president of the **Chase Brass & Copper Company** was recently announced in a farewell statement by Mr. Hart to employes of the various departments of the Chase company. Mr. Hart left the employ of Chase on January 1st after serving as president of the concern since the retirement of the late Frederick S. Chase on October 1, 1942.

★ ★ ★

THE Board of Directors have elected **Robert L. Coe** to replace Mr. Hart. Mr. Coe was employed by the company in 1917 and after spending some time in the mills joined the sales force and later became vice president in charge of sales. He held this position until September, 1947, when he was elected vice president of Kennecott Copper Corporation in charge of Kennecott's fabricating subsidiaries which included Chase Brass and Copper Company, and Kennecott Wire and Cable Company of Phillipsdale, R. I. Mr. Coe will retain his position as vice president of Kennecott Copper Corporation as well as that of president of Kennecott Wire and Cable Company, to which he was elected in 1941.

★ ★ ★

MR. W. C. **HUSTED** will continue to serve as executive vice president of the company.

★ ★ ★

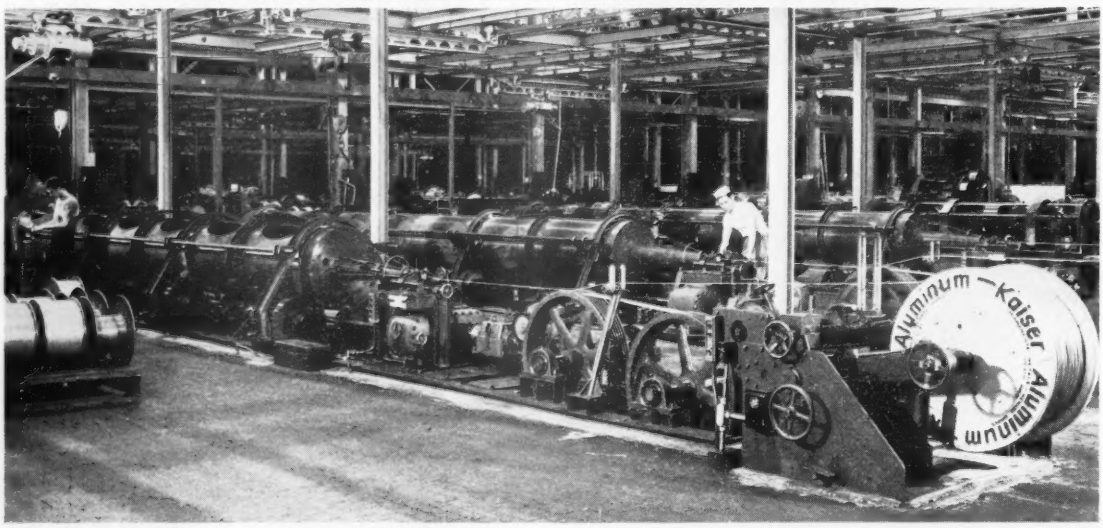
Fred G. Baker Joins Chemical Concern

THE **ELECTRO CHEMICAL SUPPLY & ENGINEERING COMPANY,** 750 Broad Street, Emmaus, Pa., announces the appointment of Fred G. Baker as Director of Engineering and Design. Mr. Baker is a chemical engineer, graduate of the Iowa State College, 1940, and until recently, a member of the Engineering Department of the E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware.

★ ★ ★

NEW 22" SPOOL 750 RPM TUBULAR STRANDER

HYDRAULIC LIFT REEL STAND—INFINITELY VARIABLE TRAVERSE AIR CONTROLLED
DOUBLE DRUM HAUL-OFF WITH LINK BELT P.I.V.—AIR OPERATED BRAKING SYSTEM



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Dr. Zay Jeffries Retires

DR. ZAY JEFFRIES, vice president of the **General Electric Company** in charge of the Chemical Department, retired from the company December 31.

★ ★ ★

A PIONEER and leader in the fields of chemistry and metallurgy, Dr. Jeffries during the war was vice chairman of the War Metallurgy Committee and chairman of two of its sub-committees. He also served as consultant for the University of Chicago metallurgical laboratory, part of the Manhattan Project for research and development work on the atomic bomb.

★ ★ ★

DR. Jeffries has been a member of General Electric's four-man committee which administers the Nucleonics Project, consisting of all work on atomic energy being conducted by the company for the government.

★ ★ ★

HE began service with General Electric in 1914 as a consultant to the National Lamp works. From 1932 to 1936 he was also president of the Carboloy Co., Inc., a General Electric affiliate, and since then has been a member of the board. In 1936, he became technical director of the G. E. Lamp Department.

★ ★ ★

IN January, 1945, Dr. Jeffries was elected a vice president by the G-E Board of Directors and placed in charge of the newly-formed Chemical Department. His department has responsibility for operations pertaining to resins, insulating materials, plastics, silicones, and other products.

★ ★ ★

Van Dyke Made Exec. Director Of Stainless Steel Producers

GRESWOLD VAN DYKE has been appointed executive director of **Stainless Steel Producers**, an organization for further development of uses of stainless steel, made up of a group of seventeen leading producers and suppliers. It is a division of the American Iron and Steel Institute.

★ ★ ★

MR. Van Dyke, a native of Philadelphia and a graduate engineer of Finsbury College, London, for many years has been connected with the steel manufacturing industry in the United States. He was associated for 29 years with Joseph T. Ryerson & Sons, Inc., Chicago, where he was manager of the special steel division, handling both stainless and alloys. He will make his headquarters at the American Iron and Steel Institute, 350 Fifth Avenue, New York.

★ ★ ★

Glynne Lobley

GLYNNE LOBLEY, Managing Director of **Birlec, Ltd.**, Birmingham, England, largest manufacturers of electric furnaces in Great Britain, died on January 16th of this year, following an extended illness.

★ ★ ★

The SPECIALISTS in Wire-Straightening and Wire-Cutting!

Diameter Range — 1/16" to .005"

PRECISION - Our Motto

DON'T hesitate to call on us when you are confronted with wire-straightening problems involving close tolerances and absolute accuracy. For seventeen years we have specialized in straightening and cutting all gauges of fine wire, hard or soft, ranging in diameter from one-sixteenth of an inch down to five-thousandths of an inch. We employ gun-barrel accuracy in straightening lengths from one inch to ten feet or any fractional part thereof. Ends cut absolutely clean without burrs.

ASK ABOUT OUR UNEXCELLED FACILITIES FOR CLEANING AND POINTING WIRE ALREADY STRAIGHTENED AND CUT.

ALL TYPES OF WIRE...

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- Bronze
- Brass
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PITTSBURGH CUT WIRE COMPANY

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R. C. McDonald

R. C. McDONALD, secretary-treasurer of **Dominion Steel and Coal Corporation,** died suddenly December 13th. Mr. McDonald was secretary-treasurer of the Nova Scotia Steel and Coal Company at the time it passed out of the hands of receivers in 1937.

★ ★ ★

HE succeeded the late M. W. MacDonald as Dosco secretary-treasurer. Mr. McDonald came to Canada from Scotland and entered the Nova Scotia industry as a youth.

★ ★ ★

Albert B. Cudebec

MAJOR ALBERT B. CUDEBEC, Vice President of **Hydropress, Inc.,** New York, died suddenly of a heart attack on January 28, 1950 in Philadelphia at the age of 72.

★ ★ ★

HE joined The Loewy Engineering Co., Limited, of England in 1937, who delegated him as their representative and trustee to the U.S.A. In 1940 he became Vice President of Hydropress Inc., of New York with whom he remained associated until his death, helping substantially in building up the activities of that corporation. He was also active in the development of ordnance equipment during World War II. His close relations with the Steel and Non-Ferrous Industries won him many devoted friends.

★ ★ ★

Peterson Heads Riverside Special Products Division

THE RIVERSIDE METAL COMPANY of Riverside, N. J., producer of nickel-silvers, phosphor-bronzes and beryllium copper, announces the appointment of **George Peterson, Jr.,** as the manager of its new Special Products division. This new unit of the company's Keystone Watch Case division has been established to seek out special products which the company is equipped to make, and to develop orders for them.

★ ★ ★

MR. PETERSON, a former engineer with the Ingersoll Steel division of the Borg-Warner Corp., has been for the past year a consulting engineer on aircraft jet engines and electronics equipment, with offices in Philadelphia.

★ ★ ★

Paul Added to Glass Fibers' Staff

HUGH W. PAUL has joined **Glass Fibers, Inc.,** Waterville, Ohio as special assistant to the president, according to an announcement by **R. H. Barnard,** president.

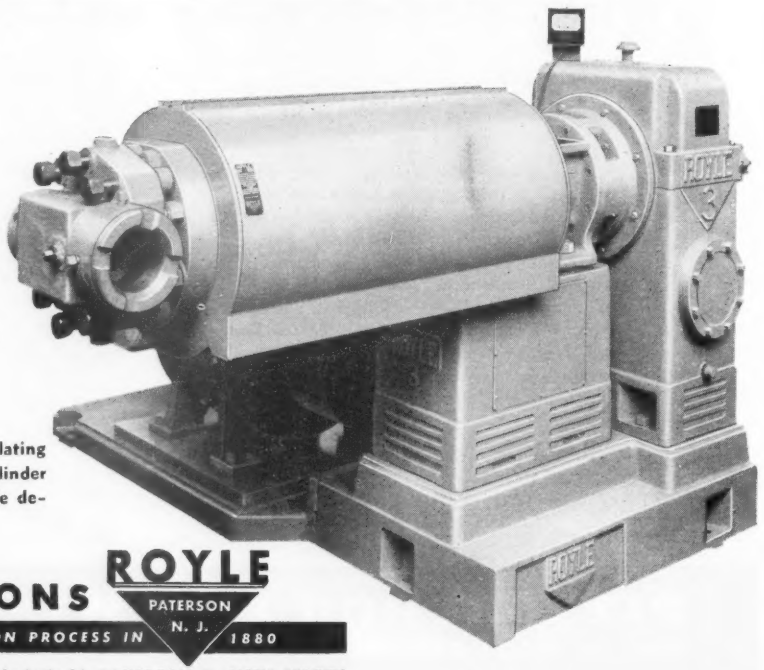
★ ★ ★

MR. PAUL'S previous experience was with Owens-Illinois Glass Company for thirteen years in various administrative and sales capacities, most recently as vice-president of American Structural Products, an Owens-Illinois subsidiary. Previously, he had been with U. S. Gypsum Company for sixteen years and, immediately before going with Owens-Illinois, had been advertising manager of USG.

★ ★ ★

ROYLE *for WIRE INSULATING*

- Continuous Vulcanizing Machines for Rubber Wire Insulation
- Plastic Wire Insulation Machines
- Strainers • Cooling Troughs
- Light Wire & Cable Capstans
- Motorized Take-Ups
- Temperature Control Units for Extrusion Processes and other industrial uses



ROYLE # 3 Plastic Wire Insulating Machine. Double extended cylinder enclosed in insulating jacket, side delivery head.

JOHN ROYLE & SONS ROYLE PATERSON N. J. 1880

PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN

London, England — James Day (Machinery) Ltd. — REgent 2430
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Akron, Ohio — J. C. Clinefelter — JEfferson 3264
Los Angeles, Cal. — H. M. Royal, Inc. — LOgan 3261

PATERSON 3, NEW JERSEY

Entwistle Appoints Castellvi

JAMES L. ENTWISTLE COMPANY, Pawtucket, R. I., world's largest producer of spark testing, marking, labelling, measuring, coiling, reeling and pneumatic wire machinery, have named a new European and South American sales representative.

★ ★ ★

THE firm appointed to represent Entwistle is **M. Castellvi, Inc.,** 150 Broadway, New York 7, New York.

★ ★ ★

MR. and Mrs. James L. Entwistle plan an extensive trip throughout the Continent this spring, visiting most of the important wire manufacturers of Europe with members of the Castellvi organization.

★ ★ ★

Norton Company Appointments

JOHN JEPPSON, assistant secretary and a director, **Norton Co.,** Worcester, Mass., has been appointed works manager of the abrasive division, and in his new position will report directly to **Andrew B. Holmstrom,** vice president and general manager of the division. **Frank G. Gifford,** manager of wheel plants, now expands his responsibilities to include all the manufacturing operations in Plant 7 perviously under the separate management of Mr. Jeppson. **John R. Bergman** succeeds Mr. Jeppson as superintendent of Plant 7, and will report to Mr. Gifford.

★ ★ ★

MILTON F. BEECHER has been elected vice president in charge of research and development by the company. **George N. Jeppson** was re-elected as board chairman and **Milton P. Higgins** as company president. **Ralph F. Gow,** executive vice president of Norton Co., was elected vice president of Norton Pike Co., and **Ralph M. Johnson,** vice president in charge of sales, Norton Co., was named to the Norton Pike Co. board. Mr. Beecher, who was appointed research engineer in 1919, became director of research at Norton in 1941.

★ ★ ★

Copperweld Steel Co. Appoints William J. Murray

WILLIAM J. MURRAY has been appointed manager of the fence department of **Copperweld Steel Co.,** Glassport, Pa. He will head up sales and installations of chain link fence, barbed wire and other Copperweld fence products.

★ ★ ★

Allegheny-Ludlum Appointments

M. J. GRAHAM, plant manager for **Allegheny Ludlum Steel Corp.** in West Leechburg, Pa., has been named production manager for all plants of the company. **F. G. Benford,** assistant plant manager at West Leechburg, succeeds Mr. Graham as plant manager. Mr. Benford is succeeded by **W. R. Yingst,** assistant manager of the West Leechburg plant finishing department.

★ ★ ★

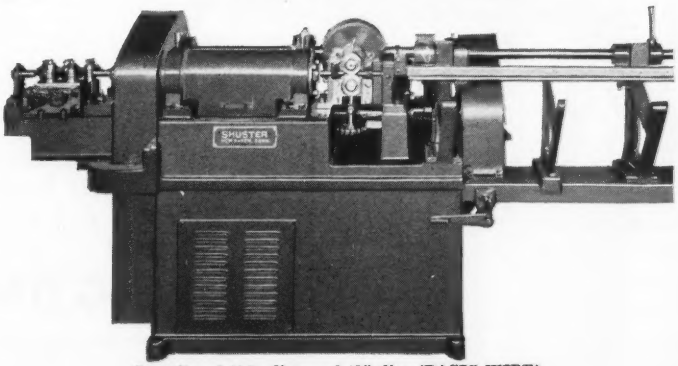
This New, Economical **"SHUSTER"**
Cuts Costs **AND** *Accurate Lengths!*

Model 2AB

Automatic

WIRE STRAIGHTENING AND CUTTING MACHINE

This new "SHUSTER"—with its five gear-driven straightening rolls—handles even badly twisted wire with ease. Square and rectangular as well as round wire may be straightened and cut to exact lengths. Other "Shuster" features that assure high speed, quality production are: almost continuous wire travel, rapid cut-off, V-belt motor drive, ball and roller bearings, and extreme rigidity throughout. Write for details.



Capacity: 3/16" dia. — 3/8" dia. (BASIC WIRE)

Mfd. by METTLER MACHINE TOOL, INC., 132W Lawrence St., New Haven, Conn.

SHUSTER *Automatic* *Since 1866*
WIRE STRAIGHTENING AND CUTTING MACHINES

Representatives in all principal cities and in foreign countries.

A Review of Recent Wire Patents

NO. 2,493,579, SOLUTION FOR ANODIC POLISHING OF STEEL AND IRON ARTICLES, patented January 8, 1950 by Milton B. Hammond, Edgeworth, and Glade B. Bowman, Coraopolis, Pa., assignors to Standard Steel Spring Company, Coraopolis, Pa., a corporation of Pennsylvania.

The articles are employed as anodes and the solution consists essentially of and contains by weight 55 to 85% phosphoric acid, 7 to 30% water, 1 to 15% of tri-alkali metal phosphate, di-alkali metal phosphate, mono-alkali metal phosphate, or phosphorus pentoxide, and at least 0.5% of a sulphate such as alkali metal sulphate or ammonium sulphate.

★ ★ ★

NO. 2,493,825, STRAND TWISTING DEVICE, patented January 10, 1950 by Axel C. Nystrom, Rutherford, and Walter J. Volckhausen, Teaneck, N. J., assignors to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

More specifically, the invention comprises a material supplying assembly for a strand-twister including a removable support for a supply of material with latches carried by a frame and disposed adjacent the ends of the support for selective actuation to free the support for removal in either of two directions.

★ ★ ★

NO. 2,494,227, MEANS FOR STRINGING SPRINGS AND THE LIKE, patented January 10, 1950 by John E. Campbell, Cuyahoga Falls, and Herbert E. Riggs, Akron, Ohio, assignors to Wingfoot Corporation, Akron, Ohio, a corporation of Delaware.

The machine is particularly adapted for stringing a number of identical short helical spring elements in stacked and ordered relation.

★ ★ ★

NO. 2,494,908, METHOD OF COATING FERRIFEROUS METALS AND ZINCIFEROUS METALS, patented January 17, 1950 by Frank Palin Spruance, Jr., Ambler, and James H. Thirsk, Wyncote, Pa., assignors to American Chemical Paint Company, Ambler, Pa., a corporation of Delaware.

The surface of the metal is coated by an acid solution including fluoride ion, dichromate ion, phosphate ion and hydrogen ion, the ions being present in amounts stoichiometrically equivalent to: fluorine 0.9 to 12.5, chromic acid (CrO_3) 3.75 to 60.0 and phosphate (PO_4) 2 to 285, all of the above being grams per liter, the ratio of fluoride ion to dichromate expressed as $F:CrO_3$, being between 0.135 and 0.405; the pH of the solution being between about 1.6 and 2.2, as measured by the lowest value indicated by a glass-electrode pH meter within the first ten minutes of immersion of the electrode in the solution and the coated surface is then dried.

★ ★ ★

NO. 2,494,909, METHOD OF COATING COPPER, BRASS, TERNEPLATE, MAGNESIUM, ZINCIFEROUS AND FERRIFEROUS METALS, patented January 17, 1950 by Frank Palin Spruance, Jr., Ambler, and James H. Thirsk, Wyncote, Pa., assignors to American Chemical Paint Company, Ambler, Pa., a corporation of Delaware.

Here the phosphate of the solution of patent 2,494,908 is replaced by an arsenate of 3.24 to 462 grams per liter.

★ ★ ★

NO. 2,495,172, SYNTHETIC WIRE ENAMELS AND CONDUCTORS INSULATED THEREWITH, patented January 17, 1950 by Charles B. Leape, Wilkinsburg, Pa., assignor to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania.

About the wire conductor is a layer of fibrous material and a coating applied to impregnate at least a part of the fibrous material, the coating comprising the resinous reaction product

Complete Description and Drawings of Patents May Be Had for 50 cents, outside the United States and Canada $1.00. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

ROLOCK FABRICATED ALLOYS

HEAT AND CORROSION RESISTANT

BIG ORDERS, we mean . . . and why not! Here's the last word for wire coil handling. It's rugged. Handles 4000 lb. load of coils. It's much safer to use. Fabricated—welded in Steel for rod baking, Monel for pickling steel, Stainless Steel for pickling brass.

This one (of an order of 10) is 7'6" long; hook 3'8½"; throat 16", but can be made to suit your load and existing tank. Cuts hourly costs, gives long service life, handles easily and safely. Reorders indicate high satisfaction. May we quote?

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Easier Operation, Lower Cost

derived by heating from 5 to 5.75 moles of maleic anhydride, from 1.2 to 1.5 moles of succinic acid, from 1.2 to 1.5 moles of adipic acid, the three acidic ingredients totaling substantially 8 moles, from 2.1 to 2.65 moles of ethylene diamine and from 5 to 6.75 moles of ethylene gylcol, the ethylene diamine and glycol totaling at least 8 moles.

★ ★ ★

NO. 2,495,212, METHOD AND DEVICE FOR MAKING BIASED SPIRAL WOUND TENSION SPRINGS, patented January 24, 1950 by Abraham de Vries and Louis de Vries, Amsterdam, Netherlands.

The method comprises forming a preformed strain free spiral spring the convolutions of which are not in contact with one another and the convolutions having one direction of turn, securing an end of the preformed spring on a rotatable member and rotating the member inside the coil of the preformed spring in a direction opposite to that of the turns of the preformed spring and forming thereon a coiled spring having the convolutions in contact with one another and having a different direction of turn from that of the preformed spring while maintaining the internal surface of the turns of the preformed spring in close contact with the external surface of the spring having the reversed turns.

★ ★ ★

NO. 2,495,630, ELECTRICALLY INSULATED CONDUCTOR AND PROCESS FOR PRODUCING SAME, patented January 24, 1950 by Stanley O. Dorst, North Adams, Mass., assignor to Sprague Electric Company, North Adams, Mass., a corporation of Massachusetts.

In order to produce a highly flexible, abrasive-resistant conductor the inventor treats the wire, the surface of which is covered by and permanently bonded to a porous refractory material, with an aluminum salt which decomposes on heating to form a hydrated aluminum oxide, then heating the so-treated product to decompose this aluminum salt and form a hydrate of aluminum oxide, which seals the pores in the refractory coating, and thereafter applying to the coated conductor a thin layer of a fatty acid containing at least eight carbon atoms.

★ ★ ★

NO. 2,496,029, WIRE TESTER, patented January 31, 1950 by Donald W. White, Jr., Flushing, N. Y., and Roland M. Zabel, Melrose, Mass., assignors to Sylvania Electric Products, Inc., a corporation of Massachusetts.

So as to reveal longitudinal fissures in wire having fissures extending only part way into the wire, these inventors proceed by sharply stressing the wire by bending it over a radius of the same order of magnitude as the wire diameter to propagate the fissures entirely through the wire thus dividing the wire into separate strands and elongating these strands unequally, and then subjecting the multistrand wire to a straight tensile load sufficient to break the unequally elongated strands but insufficient to cause fissureless wire to fail in tension.

★ ★ ★

NO. 2,496,052, SEAM FOR WOVEN WIRE FABRIC, patented January 31, 1950 by Alfred G. Hose, Lakewood, and Donald C. Dilley, Shaker Heights, Ohio, assignors to The Lindsay Wire Weaving Company, Cleveland, Ohio, a corporation of Ohio.

This wire belt for a Fourdrinier machine has warp wires of bronze connected at their adjacent ends by an alloy of gold.

★ ★ ★

NO. 2,494,595, CABLE BENDING AND TWISTING MACHINE, patented January 17, 1950 by Edward C. Taylor, Valley Stream, and August F. Brennels, Brooklyn, N. Y.

This testing machine for wire conductors comprises an electric circuit having the conductor under test in series therewith, a number of clamps adapted to secure the conductor in selected position, and electrical means to oscillate at least one of the clamps relative the other clamps, this means being connected in series with the circuit.

★ ★ ★

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1950 Wire Buyers Guide

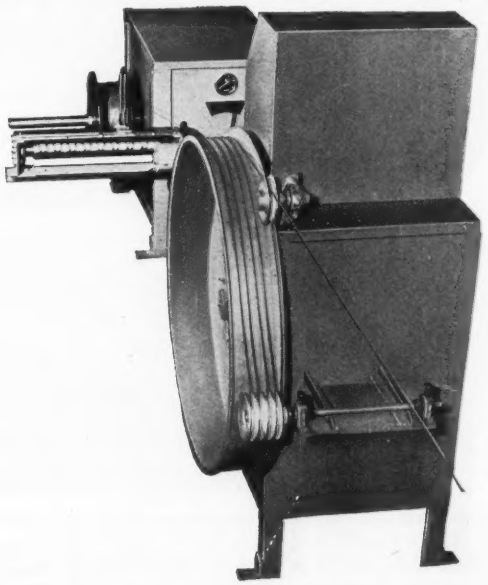
DAVIS CAPSTAN and TAKE-UP

For Thermoplastic Extrusion

HANDLES ANY VARIATION OF WIRE SPEED FROM 50 TO 1500 F.P.M.

Capstan is motor-driven, with variable speed range of 15 to 1; tachometer indicates speed in F.P.M.

A motor-driven take-up varies the speed and tension of the wire by tapped inductances. Is equipped with adjustable traverse to accommodate reels up to a maximum width of 14" and will take reels up to 30" in diameter.



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THE R. L. DAVIS ELECTRIC CO., INC. • WALLINGFORD, CONN.

SPARK TESTERS • SPOOLERS • TAKE-UPS • CAPSTANS

Phosnic Bronze a New Copper-Base Alloy

(*Continued from page 230*)

PRACTICAL values for initial modulus of elasticity are also included in Table 5. It is seen that the value for Phosnic Bronze is somewhat greater than the others. This means that, within a reasonably elastic range of stress, the stress developed in Phosnic Bronze is correspondingly greater for a given strain or deformation than in the other materials. Conversely, for a given stress, the strain developed in Phosnic Bronze is less.

* * *

Composition

Nominal	Commercial Limits (for specification purposes)
98.68% copper	98.15% copper, minimum
1.10% nickel	0.85—1.35% nickel
0.22% phosphorus	0.18—0.30% phosphorus

Forms Available

Wire, Round — 0.016″ - 0.650″
Wire, Rolled Flat — 0.093″ x 0.012″ - 0.035″ to 1.00″ x 0.025″ - 0.125″
Tube — Depending on size, quantity and properties desired, Phosnic Bronze is available on special mill orders only. Consult mill.
Rod — Round: 1/16″ to 2″ diameter; Hexagon: 1/16″ to 1″ across flats.

* * *

ELECTRICAL conductivity of Phosnic Bronze is attractively high, the average ranging from 50 to 60% IACS according to temper. Its thermal conductivity is correspondingly high, being substantially 7, 3½ and 2½ times that of high-silicon bronze (A), phosphor bronze, 5% (A), and cartridge brass, 70%, respectively. In connection with exposure at moderately elevated temperature, this insures more even distribution of temperature and a minimum of local overheating. Maximum permissible operating temperature of Phosnic Bronze is indicated by laboratory tests to be somewhat above that of the other copper alloys mentioned, although the limiting temperature is not known precisely.

* * *

PHOSNIC Bronze has the generally high corrosion resistance which is characteristic of high copper content alloys, and enjoys the obvious advantage over cartridge brass, 70% of not being subject to the dezincification type of attack under any condition of corrosion.

* * *

PHOSNIC Bronze is capable of varying degrees of cold work depending on its physical condition. In the full soft annealed state it is about as malleable and ductile as pure copper. After aging, it can still be cold worked extremely hard and even when furnished in spring temper it can be tightly coiled and bent back on itself. Further, such coiling or forming requires less expenditure of energy than is required for spring temper phosphor bronze, 5% (A) or high-silicon bronze (A). It is well suited to cold heading operations such as employed in the making of bolts.

* * *

PHOSNIC Bronze is readily hot worked, but, as in the case for other alloys, such treatment re-

YOU CAN'T DO BETTER THAN NRM WIRE & CABLE COVERING EQUIPMENT

1½″ Package Wire & Cable Covering Unit

- Complete over-all dimensions, only 13 ft. x 4 ft. 2 in.
- 1½″ oil or electrically heated extruder.
- Crosshead for wire covering up to ¼″ covered diameter.
- Wire straightener.
- Dual horizontal haul-off capstans. (Variable speed.)
- Automatic driven let-off, controlled by wire tension.
- Torque controlled dual take-up with 16″ reels.
- Space provided for wire heaters and spark tester.
- Maximum wire speed, 1000 ft. per minute.
- Net weight: 6400 lbs. (approx.)

● The 1½″ machine shown above is typical of the precision equipment manufactured by NRM. Also available are 30″ and 42″ Combination Take-Up and Cooling Units for wire and cable 1/16″ to ¼″ and ¼″ to 1½″ covered diameter.

NRM wire and cable insulating crossheads and accessories are available for all sizes of extruders.

NYLON WIRE & CABLE COVERING EQUIPMENT

All sizes are available with special screws, cylinders and crossheads for covering nylon wire and cable—or may be equipped with special dies for other nylon extrusions.

NATIONAL RUBBER MACHINERY CO. General Offices & Engineering Laboratories Akron 8, Ohio

PLANTS at Akron & Columbiana, Ohio and Clifton, N.J.
AGENTS East: National Rubber Machinery Co., Clifton, N.J.
West: S. M. Kipp, Box 441, Pasadena 18, Calif.
EXPORT Plastics Machinery: OMNI EXPORT CORP. 460 4th Ave., New York 16, N. Y.

Creative Engineering

moves the effect of previous cold working. While it also removes the effect of any age-hardening treatment, a subsequent heat treatment can be applied.

★ ★ ★

THE high strength of Phosnic Bronze is a result of the combined hardening effects of a controlled age-hardening heat treatment and subsequent cold working, either by drawing or by rolling. Phosnic Bronze is supplied in the condition as age-hardened only and also as age-hardened and subsequently cold worked in a range of tempers up to, and including, special spring temper.

★ ★ ★

SPRINGS, clips, high strength electrical conductors, bolts, nails, screws, cotter pins and parts requiring some combination of high strength, high electrical or thermal conductivity, or both, high resistance to fatigue and creep, and good workability are typical uses of Phosnic Bronze.

★ ★ ★

New Steel Mill Planned for New England

THE Commonwealth of Massachusetts has proposed the erection of a major steel plant in the East at Freetown, Mass., a short distance north of New Bedford.

★ ★ ★

AS the cost of the project would be beyond the means of even a large steel concern, The Commonwealth's proposal is that it build the plant and lease it to one of the established steel companies for twenty-five years.

★ ★ ★

SUCH a location, it is pointed out, would enjoy water transportation of oil from Laborador, limestone from Maine and coal from West Virginia. Plenty of water is available at the site.

★ ★ ★

THE object of the proposal is to bring a major source of steel close to all of New England. It will involve an estimated capital layout of some $240,000,000.

★ ★ ★

Brings Out New Wire Flattening Mill

THE Waterbury Farrel Foundry and Machine Company, Waterbury 88, Conn., has in production a new 6-inch tandem wire flattening mill that will operate at speeds up to 1000 F.P.M. or more.

★ ★ ★

THE Machine contains many improvements in design and is built to flatten wire with a high degree of precision. It is equipped with a reciprocating winder, a payoff stand, full electrical controls and dancer rolls that maintain constant wire tension. It is available as a single unit or with two or more stands, according to the user's needs. Full information may be secured by writing the company.

★ ★ ★

Crucible Steel Appointment

RUSSELL H. LUTZENHISER, formerly assistant superintendent of the Electric Furnace Dept. of the Midland Works, **Crucible Steel Co. of America,** New York, has been appointed superintendent of that department.

★ ★ ★

WIRE SPOOLS, ALL-STEEL, LITHOGRAPHED

Ends and traverses may be shipped separately and assembled easily in your plant on a hand, foot, or power press.

5" and 6½" diameter ends with 1-15/16" diameter traverses.
10½" diameter ends with 3½" diameter traverses.
Traverse lengths up to 12".

J. L. CLARK MANUFACTURING CO.
600 23rd AVENUE • ROCKFORD, ILLINOIS

Technical Data Sheet Describes Duridine

TECHNICAL Service Data Sheet No. 3-2-210, revised and brought up-to-date describes the "duridizing" process, a low-cost, fast and simple phosphating method for rust proofing and for preparing metal surfaces for good paint adherence. It tells how the process works, gives its many applications and describes the steps required to do a successful job. You are invited to send for a copy of this bulletin.

* * *

New Catalog on Conduits

NATIONAL Electric Conduits is the title of the new 30-page Catalog No. 603 which describes and illustrates the many types of electrical conduits that are manufactured by **National Electric Products Corp.**, Chamber of Commerce Bldg., Pittsburgh 19, Pa.

* * *

New Loom Motor

THE LOUIS ALLIS CO. of Milwaukee, Wisconsin, has recently announced the development of a new ball bearing loom motor.

* * *

THE development of this loom motor incorporates findings which were established in a series of comprehensive tests that were performed to settle the long controversy over the most satisfactory loom motor design. Emphasis was placed on bearing construction, mechanical stability, electrical performance, over-all loom efficiency and performance of the loom under actual mill operating conditions.

* * *

FIELD tests clearly demonstrated that grease lubricated ball bearing motors of this new design would satisfactorily withstand the severe shock and vibration encountered in high speed weaving and, at the same time, would eliminate the necessity for frequent oiling of waste packed sleeve bearings which had formerly been used on loom motors. In addition, these tests indicated that the smoothest loom drive is obtained without the use of external flywheels, but with a special stator and rotor design which provides medium to high slip. By this means, power peaks are greatly reduced and regeneration is minimized or completely eliminated.

* * *

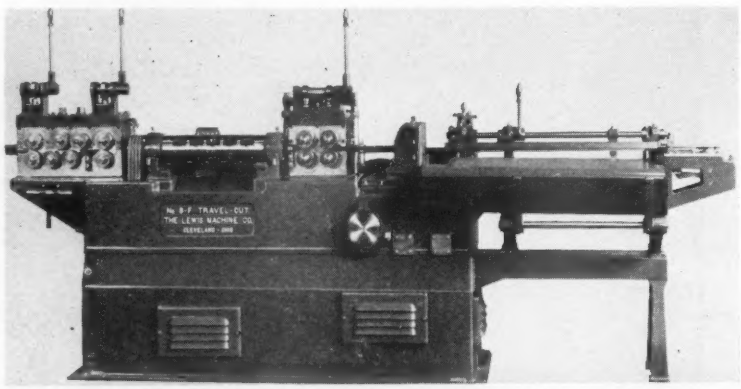
Portsmouth Steel Corporation Announces Cyrus Eaton, New President and Chairman of the Board

PORTSMOUTH STEEL CORP., Cleveland, announces resignation of **E. A. Schwartz** as president and resumption of that office by **Cyrus Eaton**, who again assumes the joint posts of chairman of the board and president which he originally held at the time of the formation of the Portsmouth company in May, 1946.

* * *

CUT YOUR CUTTING COST WITH

LEWIS TRAVEL-CUT



Wire Straightening & Cutting Machines

The simplicity of design and rigid construction of the Lewis Travel-Cut makes it well suited for the most severe high-production requirements. This machine feeds the wire from the coil, straightens, gauges to accurate length, and cuts while in motion thus producing uniform diameter rod free of arbor swell and feed roll marks. It is particularly adapted to precision work on bright finished steel, brass, aluminum, stainless, and alloy wire. This method of cutting is also very efficient for short lengths such as welding rod, special bolts, etc., and increases the over-all efficiency approximately 20% over the conventional type of cut-off.

Machines built in various sizes to handle from 1/16" up to 3/4" diameter, and 1/16" to 5/8" square or equivalent area in hexagon and flat.

Exclusive Representatives

EAST: Penn Machinery Co., 117 North Third Street, Philadelphia 6, Penn.

MIDDLE WEST: Steel & Wire Machinery Co., 1017 Helmsdale Rd., Cleveland 12, O.

CENTRAL: Moslo Machinery Co., 2443 Prospect Avenue, Cleveland 15, Ohio.

WEST COAST: Hoffman & Heartt, 3005 So. Grand Ave., Los Angeles 7, California.

CANADIAN: Empire Engineering Co., 11 Wellington St. E., Toronto 1, Ontario.

CONTINENTAL EUROPE: Gaston E. Marbaix, Ltd., Devonshire House, Vicarage Crescent, London S. W. 11, England.

The LEWIS MACHINE Company
3441 E. 76th Street, Cleveland 4, Ohio

Also agents in Paris, Stockholm, Rotterdam, Brussels, Zurich, Milan, Bombay and Melbourne

Steelskin

REG. U.S. TRADE MARK

SPECIAL PURPOSE WET AND DRY DRAWING SOAPS
COMPOUNDS FOR FERROUS AND NON-FERROUS ALLOYS

BRASS • BRONZE • COPPER • ALLOYS
STAINLESS STEELS • TOOL STEELS
LOW CARBON • HIGH CARBON

for

ROPE WIRE · MUSIC WIRE · SCREEN CLOTH · NAIL WIRE · FENCE WIRE · NEEDLE WIRE · SPRING WIRE · COAT HANGER WIRE · OTHER TYPES OF WIRE

CONSULT US
WRITE
OR
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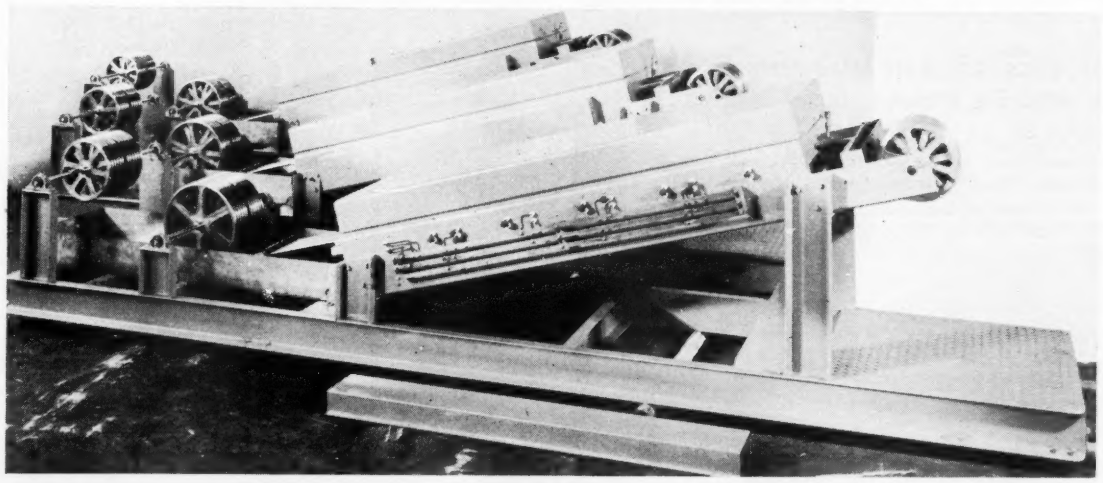
HOMER, N. Y.

R.H. MILLER CO., Inc.
MANUFACTURERS OF
WIRE, TUBING, STAMPING, DEEP
DRAWING SOAPS AND COMPOUNDS

OUR ENGINEERS
WILL BE GLAD TO
COOPERATE WITH
YOU.

CONTINUOUS WIRE ANNEALERS



ESTD 1888 AIMCO INC. 1918
"American" INSULATING MACHINERY COMPANY
517 West Huntingdon Street
Philadelphia 33, Pa., U.S.A.

Combine annealing with your copper wire enameling operations by installing an "AIMCO" Type CW electric heated pre-annealer.
Standard models for up to 20 lines of wire.
Especially recommended for installations operating at comparatively low oven temperatures insufficient to anneal the wire during the enameling process. Illustration shows bus bar cover removed.

Send for Description

Non-Ferrous Wire Manufacture in England

(*Continued from page 220*)

mainly for alloys such as 70/30 brass, phosphor bronze, etc. Much of the 16 s.w.g. wire produced on the non-slip machines is, after annealing, further processed to 20 s.w.g. After a final annealing, this wire is sold to fine-wire makers.

★ ★ ★

ADJOINING the brass wire mill is a department termed the nickel-silver mill, where complex alloys are drawn in the form of round wire. Shaped wires and small alloy tapes are also produced in this mill by processes combining drawing through single-hole blocks with cold rolling.

★ ★ ★

Tape Production

COPPER tape and strip for electrical and other purposes is produced in sizes up to 2¼ in. wide x ¼ in. thick. The larger sizes of tape are produced from a base extruded to a rectangular cross-section and the smaller sizes from a rolled rod of circular cross-section. The tape mill plant includes a number of heavy and light drawing blocks, and a number of heavy and light rolls. Most tapes and strips are manufactured by a combination of rolling and drawing. In drawing the rectangular shapes, steel dies are used for the most part. Some of the small rectangular tapes are now being made upon continuous wire-drawing machines.

★ ★ ★

Hot-Rolled Plates

PLATES for locomotive fireboxes are made in both deoxidized and tough pitch copper containing 0.3/0.5 per cent arsenic. Castings are made in the copper refinery, which consists of a battery of 20-ton reverberatory furnaces fired by pulverized coal. The coal is purchased in the form of peas of about ⅜ in. cube, and after pulverizing in Herbert Atritors, is fed to two burners on each furnace by a bin and feeder system. This form of firing is economical, and allows for close control of temperature and furnace atmosphere. The refinery cycle of 24 hours follows the usual process using Bessemer bar and scrap, the product being discharged by hand "lading" directly into a mould, in the case of tough pitch copper, or via a large ladle in the case of deoxidized copper. Castings are made in flat open moulds and vary in weight up to five tons, according to requirements.

★ ★ ★

AFTER surface machining they are hot rolled in two stages to the required thickness (9/16 in. to 1 in.), advantage being taken of the break in the rolling process to dress out any surface imperfections with pneumatic chippers. If tube plates are required, machining is carried out on the rolled plate leaving the portion to which the tubes will be fitted at a thickness of about 1 in., while the remaining area is reduced to 9/16 in. to ⅝ in.

★ ★ ★

FLANGING is carried out by hand mallets upon cast-iron moulds, which are either cast to shape or built-up in sections. For flanging, a pre-heating temperature of not more than 850° C is

FOR QUICK, ACCURATE MEASUREMENT OF WIRES OR CABLES . . .

Wires or cables passing through this machine are accurately measured and their lengths recorded on an easily read counter. Lengths up to 100,000 feet . . . nearly 19 miles . . . can be registered. Counter can be easily set back to zero at the start of a run. Machine is also available with counter mounted on right side. It can also be supplied with electric predetermined counter if desired.

Heavy cast iron standard, optionally supplied, provides firm support for machine, may be easily moved about on its rollers and adjusted to proper height by the rack and pinion. Machine illustrated is made in two sizes — No. 1 for measuring wires to ⅝" diameter and No. 2 for wires to 1½". We also manufacture a small bench type machine for measuring any flexible material not over 5/16" diameter

For complete specifications ask for Circular No. 1

NEW ENGLAND BUTT COMPANY
Established 1842
304 PEARL STREET • PROVIDENCE 7, R. I., U. S. A.

JAMES DAY, MACHINERY LTD., 90 REGENT ST., LONDON, W-1, ENGLAND

used, and the malleting is continued down to about 500° C, the number of heatings varying according to the complexity of the shape of the plate. Door plates are made in a similar way, but there is no machining operation. On the other hand, the fire-hole has to be made. This is formed, in the first stage, under a steam hammer and finished by means of malleting. Such hand flanging operations are being reduced in the Metals Division by the installation of a flanging press.

★ ★ ★

ALLOY PLATES—Castings for condenser, heat exchanger and alloy plates are made from Yellow Metal, Naval Brass, 70/30 brass or Admiralty brass, Cupro-nickel, Everdur, 97/3 bronze, Alumbro and aluminium bronze and are melted in Ajax-Wyatt electric furnaces. After suitable machining, the castings are heated to temperatures which vary with the particular alloy, and are then hot rolled to desired thickness in a number of stages, according to the final thickness required. Cutting to shape is carried out upon bandsaws, lathes, etc. Plates have to conform to close tolerances for dimensions and flatness, and to tensile and other physical tests required by the Admiralty and other authorities.

★ ★ ★

HOT-ROLLED sheets call for little comment. They are made in copper and in various alloys as given under the heading of "Alloy Plates." Much of the trade in hot-rolled sheets has been replaced, in recent years, by cold-rolled sheets which are better in respect of properties, uniformity of dimensions and surface finish.

★ ★ ★

SLAGS from the copper refinery, skimmings from electric and crucible furnaces, and various other residues are treated for the recovery of their metal content. The plant consists of concentrating tables and a cupola. The various residues, with or without treatment on the concentrating tables according to their nature and cop-

NORBIDE Abrasive: Effective, Economical

This abrasive—second only to the diamond in hardness and 150 times less expensive—does an efficient job of cutting and semi-finishing cemented carbide wire drawing dies.

NORTON CO. — Worcester 6, Mass.

DAVIS-STANDARD Insulating Machines

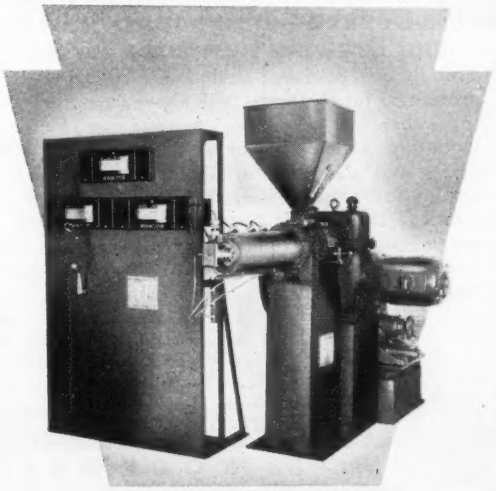
Clean head design and accurate temperature control in these Davis-Standard Insulating Extruders assures wire concentricity. Machines for rubber and thermoplastics, including Nylon; continuous vulcanizing insulating machines; wire handling equipment. Extruding Machines for rods, tubing, profiles, straining, Nylon covering of wire rope.

Complete Engineering and Manufacturing Facilities for Your Most Critical Demands.

THE STANDARD MACHINERY COMPANY, MYSTIC, CONN., U.S.A.

Established in 1848 *Incorporated in 1875*

Pacific Coast Representative:
W. H. DEL MAR COMPANY
5140 CRENSHAW BLVD., LOS ANGELES, CALIFORNIA



2" Davis-Standard Thermo-Plastic Extruding Machine

Diamond Distributors Inc.

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PRECISELY GRADED

DIAMOND POWDER

SERVING INDUSTRY'S

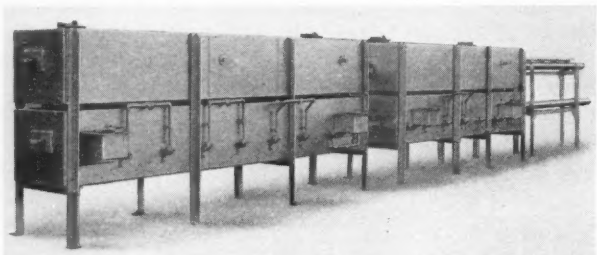
SPECIALIZED NEEDS

I.D.A. MEMBER INDUSTRIAL DIAMOND ASSOCIATION OF AMERICA, INC.

40 West 40th Street • New York 18, N. Y.

ROCKWELL FURNACE-OF-THE-MONTH

Ready for Shipment to a Large Steel Wire Mill



Double-Decked Continuous Bright Hardening, Quenching and Drawing Furnaces for Strip and Flat Wire

This unique Rockwell design integrates two furnace units, one above the other, in a single compact mounting, with each pair of hardening and drawing furnaces operating independently of the other pair. The metal is heated while moving through the muffles of the hardening furnaces, thence through quench blocks, drawing furnaces and cooling tubes, always in a protective atmosphere, to emerge ready for coiling. Furnaces are gas fired, with zone control of temperature.

Rockwell builds continuous and batch furnaces, electric or fuel fired, for all wire heating operations.

ROCKWELL ALSO BUILDS { *Coil winding machines, reels and spools; pickling, brushing, cleaning, washing, finishing, drying and handling equipment; ovens and dryers; special fabrications; non-ferrous rod mills.*

ROCKWELL SINCE 1888 BUILT

FURNACES • OVENS • SPECIAL MACHINERY

W. S. ROCKWELL COMPANY

242 ELIOT STREET • FAIRFIELD, CONN.

In Canada: Francis Hankin & Co., Ltd. Montreal & Toronto

per content, are charged into a cupola together with coke as fuel, and suitable fluxes. The products are a slag, which is returned for further treatment, and a metal "pill" containing about 95 per cent of copper. These "pills" are afterwards treated in the refinery along with copper scale, and ultimately the copper recovered is used in normal refinery charges.

★ ★ ★

An Investigation of the Weavability of Wire With Observations on the Defects of Wire and Wire Cloth

(*Continued from page 225*)

IT should be noted that because of instrumental errors, the one-hundred pound tensile machine should not be used for testing wires with transverse strengths less than about twenty pounds. However, the author has used this same yoke and a ten pound tensile machine in testing 23 gage wire with excellent results. For investigating the workability of very fine wires a much more delicate, commercial "stiffness tester" may be used. Wires with transverse strengths greater than one-hundred pounds must, of course, be examined with heavier equipment. Heavier equipment has been used in a few cases to produce loads up to two hundred pounds with equally satisfactory results. However, the inexpensive equipment described here covers most of the range where heat treatment variations are especially important. This year the transverse-crimp-sensitivity test clearly demonstrated that the workability of certain unsatisfactory weaving wire varied drastically from point to point, (33).

★ ★ ★

Part III will be published in the April 1950 issue of Wire and Wire Products.

★ ★ ★

The References and Acknowledgments will be published with Part IV of this article.

★ ★ ★

New Oakite Booklet Describes Versatile Anti-Rust Material

OAKITE PRODUCTS, INC., New York, has announced the publication of a 16-page, illustrated booklet providing interesting descriptive data on Oakite Special Protective Oil, a material which is designed to give semi-permanent rust protection to metal parts during production, in storage or while awaiting shipment.

* * *

THE booklet describes Oakite Special Protective Oil as an efficient rust-preventive oil of extremely low viscosity which imparts a thin, protective film to ferrous surfaces, resisting moisture, humidity, perspiration, residues and acid fumes. This film does not alter dimensions or surfaces of finely finished parts, nor is it necessary to remove it for gauging and similar inspection procedures, or for soldering or welding of light gauge metals.

* * *

BESIDES providing interesting data on efficient anti-rust procedures, the booklet also features a special flow chart showing strategic points along the production line where this material may be applied effectively. Readers desiring free copies of this booklet should address Oakite Products, Inc., 52A Thames St., N. Y. 6, N. Y.

* * *

"Try-it-for-Size" Clamp Kit Offered by Hunter

A NEW "try-it-for-size" kit (No. NC-11) of eleven different neg'ator clamps — members of a new and unusual family of one-piece coil-form gripping devices just introduced to industry this Fall — is announced by **Hunter Spring Company**, Lansdale, Pa., to help research, maintenance, production and display people investigate different possible uses and determine which styles and sizes best suit their particular requirements. The trial kit price is $3.00.

* * *

If it's twisted folded pressed crushed shaped braided woven paper

TWITCHELL makes it

treated braiding and wrapping yarns

treated wire-rope cores

slit kraft or jumbo rolls for crushing and wrapping operations.

waxed cable-fillers for 2- and 3-wire non-metallic sheathed cable, varnished cambric, and shipboard cable.

E. W. TWITCHELL INC.
Third & Somerset Streets
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Yarns for Electric Wire

Proven by wide usage — greater efficiency in Serving and Braiding when packages of Silk, Nylon or Acetate are the product of our mills.

Producers also of Tracer and Marker Trams that meet Underwriters' Laboratory Specifications.

Consult us on your specific problems.

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IMPROVED PERFORMANCE

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MURIATIC AND SULFURIC ACID

PICKLING BATHS

A little "RODINE" added to the pickling bath —

- SAVES GOOD METAL
- PROLONGS THE LIFE OF THE ACID BATH
- MINIMIZES HYDROGEN EMBRITTLEMENT
- PREVENTS OVER-PICKLING
- EXPEDITES SCALE REMOVAL
- ASSURES CLEANER, BETTER SURFACES
- REDUCES ACID FUMES
- IMPROVES WORKING CONDITIONS

Rodine®

is the standard inhibitor — used all over the world — by foremost industries. It has pioneered the way for quality production, control and economy.

There's a type of "RODINE" especially created for the job you have on hand.

We will be glad to send you complete technical information about your pickling production.

American Chemical Paint Co.
AMBLER ACP PENNA

Takes Over Black Nail Machine Manufacture

THE OHIO ELECTRIC MFG. CO. has purchased the nail making machine business of **Black Industries, Inc.**, Cleveland.

* * *

BLACK Industries developed a new high-speed silent wire nail machine that it has been manufacturing for the past two years. Ohio Electric is taking over all business on hand and will continue delivery of machines and spare parts to Black's former customers.

* * *

CHESTER BLAND, president of Ohio Electric, states that this purchase is one more phase of his company's program for expansion of its markets and diversification of its output. Ohio Electric also makes electric lifting magnets, heavy-duty electric hoists and fractional horsepower motors.

* * *

Bibliography of Industrial Diamond Applications

BEGINNING with the January 1950 issue some changes take place in this Bibliography issued by the Industrial Diamond Information Bureau, 32-34 Holborn Viaduct, London, E.C.1. References to the articles abstracted are now arranged according to suggestions of The Abstracting Services Consultative Committee of the Royal Society, and their titles are printed in bold letters so that an easier survey is possible. In addition, each issue will contain a summary of articles which are of particular interest to the diamond tool industry to act as a guide to the main contents.

* * *

IT may be mentioned that the monthly Bibliography increased in size during the last two years from about 24 to 52 pages per issue. The Bibliography is sent free of charge to those interested technically or commercially in industrial diamonds.

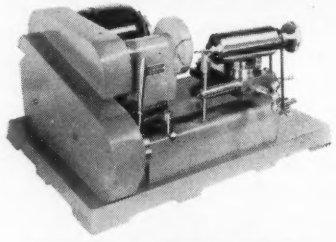
* * *

ROOS DYKREX

MACHINE CORRECTS AND REJUVENATES YOUR

DIES

to original condition



IT'S MORE than a POLISHER

IT'S MORE than a LAPPER or RIPPER

It corrects the die by straightening out any eccentric entrance angles on the dies.

ROOS TOOL & Mfg. Co.
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NEWARK 4, N. J.

Distributed by
Eastern Carbide Corp., New Rochelle, N. Y.
Carboloy Co. — Detroit — Pittsburgh — Newark—and all Principal Cities.
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STANNOUS SULPHATE

for IMPROVED LIQUOR FINISHING of STEEL WIRE!

Stannous Sulphate, used for either straw color or white liquor finishing, provides these outstanding advantages:

1. A superior, smoother coating
2. Positive control — making it possible to produce uniform coatings day in and day out
3. Easier to use — fewer operations involved
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Write for information on how to use Stannous Sulphate to best advantage in your liquor finishing.

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Sjogren WEDGE GRIP

Used by Wire Men Who Want the Best!

SJOGREN TOOL AND MACHINE CO., INC.

WIRE PULLERS • WEDGE GRIPS • JAWS FOR ALL MAKES OF PULLERS AND TESTING MACHINES • CAGE ROLLERS • SWAGING HAMMERS • POINTING DIES • WIRE SPOOLERS

14 SWORD STREET
AUBURN
MASSACHUSETTS

Represented in Canada by THE LARSON CO., 98 Wellington St., West, Toronto, Ont.

G. R. Brophy to Head International Nickel's New England Technical Section

G. R. BROPHY, Research Metallurgist, was made head of the New England Technical Section of International Nickel's Development and Research Division located in Hartford, Connecticut, effective January 1, 1950, according to an announcement by **T. H. Wickenden,** Vice President and Manager of the Division. He will succeed the late **D. A. Nemser.**

★ ★ ★

Reprint of Lecture on Martempering Carburizing Procedure

THE AJAX ELECTRIC COMPANY, Philadelphia 23, Pa., has available for distribution copies of a paper by **Joseph E. Ebner,** Factory Manager of Evinrude Motors, which covers the technique employed in combined carburizing and martempering in a single heating operation. It compares the economics of this method with the processes it replaces. Copies will be sent upon request.

★ ★ ★

MODERN
SPOOLERS and COILERS

May improve your efficiency in a long forgotten department. We have developed new designs that may reduce your labor costs considerably. Tell us your spooling problem and we will gladly help you benefit from our experience with no obligation on your part.

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REELS and SPOOLS

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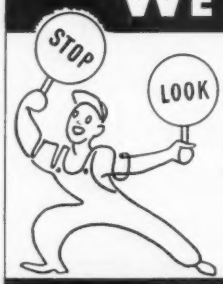
AURORA ILLINOIS

WE BUY WE SELL

We Pay Highest Prices for Used Machinery



126-REEL CABLING MACHINE

Reel size 16" x 10" . . 2 Sections . . 63 Bays each . . Back section turns in either direction . . Complete in every detail.

PRICED FOR QUICK SALE

All Machines Reconditioned in Our Own Shop

WIRE & TEXTILE MACHINERY INC.
P. O. BOX 436, PAWTUCKET, R. I.

REELS SPOOLS

ALL SIZES

WOOD- PLYWOOD -WOOD-METAL

RETURNABLE NON-RETURNABLE

Samples and Prices on Request

DURKEE MFG. CO. PINE RIVER, MINN.

Buy MONTGOMERY Tinsel Wires

TINSEL CONDUCTORS • RESISTANCE TINSEL
TINSEL LAME • • • TINSEL THREADS

Bare electrical conductors and resistance elements wound on reels ready for insulating with plastic, rubber, etc. Available for prompt deliveries.

Lame and thread furnished in large packages for economical and efficient production on high-speed looms.

Send for samples and engineering data.

THE MONTGOMERY COMPANY
25 Canal St., Windsor Locks, Conn. Tel.: Windsor Locks 14

Ludlow-Saylor Opens New Warehouse and Sales Office

THE LUDLOW-SAYLOR WIRE CO. of St. Louis, Missouri, takes pleasure in announcing to its many California and West Coast friends and customers the opening of a new warehouse and sales office at 3030 East Olympic Blvd., Los Angeles 23, California.

★ ★ ★

UNDER the able management of **E. M. West** and **Jack F. Schroeder,** a complete stock of popular grades of industrial wire cloth in various metals will be maintained for prompt delivery. In addition, either Mr. West or Mr. Schroeder will be available at all times to consult with you regarding special requirements which the St. Louis plant is in position to furnish upon request.

★ ★ ★

ESTABLISHED in St. Louis in 1856, Ludlow-Saylor has developed and engineered their own wire-weaving equipment until today it has one of the most modern and complete plants in the country.

★ ★ ★

ITS Engineering Department, together with its experienced craftsmen, resolves the most difficult wire cloth or screen problem or application to one of quick solution. Its location in the heart of the wire mill industry gives it ready access to the latest research and improved technique.

★ ★ ★

YOU are cordially invited to visit the new facilities on East Olympic and avail yourself of the many advantages which this branch office and warehouse affords.

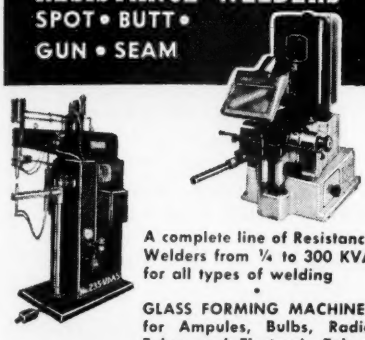
★ ★ ★

New Flux for Gold and Silver Soldering

A NEW liquid flux developed especially for use in gold and silver soldering operations has been announced by **Handy & Harman,** 82 Fulton Street, New York 7, N. Y. Copies of a descriptive bulletin are ready for distribution. Ask for Bulletin 18.

★ ★ ★

EISLER
RESISTANCE WELDERS
SPOT • BUTT •
GUN • SEAM



A complete line of Resistance Welders from ¼ to 300 KVA for all types of welding

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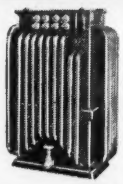
GLASS FORMING MACHINES for Ampules, Bulbs, Radio Tubes and Electronic Tubes.

TRANSFORMERS
STANDARD • SPECIAL



Air, Oil, or Water Cooled
Made in sizes from ¼ to 500 KVA

FURNACE • DISTRIBUTION • POWER LIGHTING • PHASE CHANGING • WELDING • ELECTRONIC DEVICES, Etc.

SEND FOR NEW CATALOG NO. TR-50

CHAS. EISLER
EISLER ENGINEERING CO., Inc.
747 So. 13th St. Newark 3, N. J.

Improved Screw Wire Developed

A NEW process has been developed by **Ray S. Simmons,** chief metallurgist at Keystone, that results in an improved wire stock for manufacturing recessed head screws. This refined cold heading stock has been thoroughly tested in customers' plants. Advantages derived from its use include increased life of dies and plugs, reduced rejections, less machine down time, and savings in cost of expensive final inspection. A better finished product results from this improved wire.

★ ★ ★

THE unique process developed by Mr. Simmons for producing this wire starts with the steel that is later drawn into the wire stock. The surface of the steel stock is improved to such an extent that it is comparable in characteristics to that found in the best of high grade bars.

★ ★ ★

THE process is a refinement and advancement of the normalizing process. In air-tight vessels the steel stock is heated under the action of controlled atmospheres to produce a structure and surface necessary to withstand the severe and drastic cold upsetting of wire to be made for recessed heads of all types. After this special heat treatment, the stock is drawn through a special lubricant to an intermediate wire size and then carefully annealed in process before the final drafting to the desired final wire size.

★ ★ ★

SPOOLS... REELS... BOBBINS

● IF IT CAN be wound on a reel, spool or bobbin, Apco Mossberg can fill your needs.

For over 50 years we have specialized in the manufacture of spools and reels of all kinds. Our plant is equipped to manufacture almost any conceivable kind, type and size of steel spool, reel and bobbin, in large quantities or small.

Write for our brochure containing useful information on a wide variety of our spool and reel products.

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IT can be used in the cold upsetting of round, flat, oval, fillister, truss, binding, pan, hexagon, and slotted recessed Phillips and clutch head machine screws, sheet metal screws, cut screws, and self-tapping screws.

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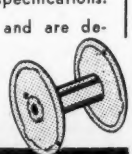

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Standard Sizes 1¾" to 12" Head Diameters

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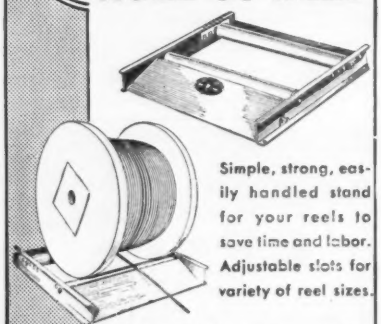

Simple, strong, easily handled stand for your reels to save time and labor. Adjustable slots for variety of reel sizes.

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Reynolds Plans to Run All Four Pot Lines at Jones Mills Plant

FIRST capacity operation of **Reynolds Metals Company's Jones Mills** (Arkansas) aluminum reduction plant since the war will occur late in March, a company spokesman announced.

★ ★ ★

THE plant has four pot lines, each with a capacity for producing 36,000,000 pounds of aluminum annually. This gives the plant a yearly capacity of 144,000,000 pounds of aluminum.

★ ★ ★

New Research Firm Available For Metallurgical Problems of the Wire and Tubing Industry

A NEW research and consulting firm, specializing in the forming of metals, is offering its services to the metal forging, drawing, rolling and extrusion industries. **Dr. George Sachs, Dr. Harry P. Croft** and **G. B. Espey** are active as metallurgical specialists in this new firm which will be known as **Metals Research Associates, Inc.** Others with interests are **Lee Wilson,** Chairman of the Lee Wilson Engineering Company, Inc. and the chemical research and consulting firm of **C. F. Prutton and Associates,** in Cleveland.

★ ★ ★

GOOD personnel coverage is offered in both the fundamental and practical phases of research. Dr. Sachs who was formerly department head of the Kaiser-Wilhelm Institute for Metals Research in Germany and founder-director of the Laboratory for Mechanical Metallurgy at Case Institute of Technology will head the firm. He is well known for his investigations on extrusion and the development of theory and mathematical solution for the forces and energy consumption in the drawing of wire and sheet. After a survey of over two thousand publications relating to the rod and wire industry, representatives of the British Iron and Steel Research Association recently evaluated these theories and

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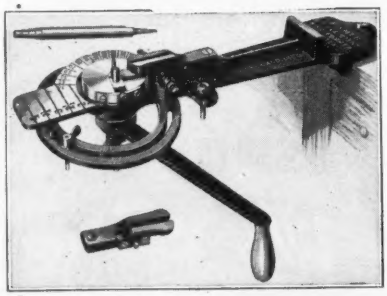

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The cut on right shows a few of the thousands of the forms made on this WIRE FORMER

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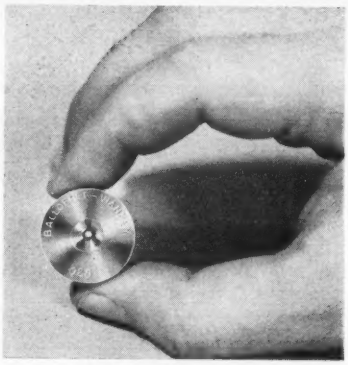

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solutions as simple, yet valuable to a basic understanding of the process of drawing. Further practical research, relating to the fields of tube and wire drawing, was directed in the United States by Dr. Sachs under the sponsorship of the Wolverine Tube Company, Frankford Arsenal and the Engineering Foundation. It was for the Frankford Arsenal portion of this work that Case Institute of Technology received the Army distinguished Service Award during the World War.

★ ★ ★

THE results from these projects have been published in numerous papers in the AIME Metals Technology and the ASME Transactions and Journal of Applied Mechanics.

★ ★ ★

GEORGE ESPEY was with Dr. Sachs as senior research engineer on these drawing projects and prior to joining Metals Research Associates, Inc., was metallurgist for the Lee Wilson Engineering Company, Inc., designers and builders of industrial furnaces for the metal industry.

★ ★ ★

DR. HARRY CROFT, who is consulting part time with the organization was, until his recent resignation, director of research for the midwest division of the Chase Brass and Copper Company and has a broad experience in the casting, extrusion and drawing of non-ferrous metals.

★ ★ ★

LEE WILSON is well known in the rod and wire industry, as developer of the radiant tube method of heating and founder of the Lee Wilson Engineering Company, Inc.

★ ★ ★

THE research facilities of this new firm are in Cleveland, the metallurgical laboratories being at 20005 West Lake Road, and the chemical facilities at 2310 Superior Avenue. Consulting and research is presently being handled for some of the nation's leading concerns in the metal industry.

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WATERBURY FARREL FOUNDRY & MACHINE CO.
Waterbury, Conn.

Government Wire Production Information

(*Continued from page 234*)

the average measured diameter of not less than 10 warp wires and of the same number of filler wires taken at random from the finished screening.

★ ★ ★

5.5.3 FOR standard galvanized insect wire screening a size of wire may be used for the warp that is different from that (size) employed for the filler; such variations in size, however, shall not be excessive, and in all cases the average diameter of warp and filler wires for galvanized steel insect wire screening shall be 0.011 inch. For standard commercial bronze and aluminum insect wire screening, the same wire diameter shall be used for both the warp and the filler, 0.011 inch for bronze and 0.013 inch for aluminum.

★ ★ ★

5.6 SELVAGE.—There shall be one (1) or more wires in both selvage edges of all standard insect wire screening.

★ ★ ★

5.7 TOLERANCES. — Permissible variations shall be:

(a) For wire diameters: 0.0005-inch, plus or minus.
(b) For mesh count:
Warp, one-quarter mesh per linear inch, plus or minus.
Filler, one-half mesh per linear inch, plus or minus.
(c) For width: plus or minus ⅛ inch.
(d) For length: minus 2 inches.

★ ★ ★

6. Packaging

6.1 UNLESS otherwise specified, standard insect wire screening shall be enclosed in such standard commercial containers, or wrapping, as will insure acceptance by common or other carriers for safe transportation to the ultimate point of delivery, at the lowest applicable rate.

★ ★ ★

7.0 Labeling

7.1 THE mesh count, size, kind and finish of wire, the length and width of the screening enclosed, shall be shown in a con-

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Designers and Builders
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WIRE WORKING MACHINERY
WIRE MILL EQUIPMENT
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STEEL EQUIPMENT CO.
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Prepared Atmosphere Generators.
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For Mechanical Purposes
Plain Polished, Tinned, Straightened and Cut Lengths
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Brass	Resistance
Copper	Stove Pipe Wire
Florists	Stainless
Monel	Straightened and Cut
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Phosphor Bronze	
Picture Wire	

THE MALIN & CO.
2514 Vestry Ave., Cleveland 13, Ohio

spicuous place, preferably by means of a printed label, on the outside wrapping or covering of each roll of standard insect wire screening.

★ ★ ★

8.0 Guarantee

8.1 IN order to assure the purchaser that he is receiving insect wire screening that complies with the requirements of this standard, it is recommended that the label on each roll carry the following guarantee:

The manufacturer declares that this insect wire screening complies with all requirements of Commercial Standard CS138- , as developed by the trade under the procedure of the National Bureau of Standards and issued by the United States Department of Commerce.

★ ★ ★

Sells Chemicals Division

UNITED STATES RUBBER COMPANY has purchased the Chemicals Division of **The Glenn L. Martin Company,** according to a joint announcement recently by the two companies. The rubber company will acquire all assets of the division, including the Marvinol resin plant at Painesville, Ohio, laboratory equipment in Baltimore, patents and the trade name Marvinol. The purchase price was not announced.

★ ★ ★

THE business will become a part of the Naugatuck Chemicals division of the rubber company. The Painesville plant will continue to make Marvinol vinyl resin for sale to manufacturers of plastic products. United States Rubber Company said the purchase is part of a long-range program to expand its activities in the chemical field.

★ ★ ★

IN processing, compounds of Marvinol can be calendered or extruded or formulated into dispersions; they can be embossed and polished and have many other unusual characteristics which make them applicable to many fields. Among the major uses are floor and wall coverings, wire coatings, upholstery, packaging, raincoats and protective apparel. They are oil and water resistant, odorless, tasteless, tough, durable and fire resistant.

★ ★ ★

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FLY SHUTTLE TYPE
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Any Type or Gauge
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ABRASIVES—
Norton Co., Worcester, Mass.

ACID INHIBITORS—
(See Inhibitors, Pickling)

ACID-PROOF CONSTRUCTION—
Haveg Corporation, Newark, Del.

ANNEALING MACHINES—Open Flame
Syncro Machine Co., Perth Amboy, N. J.

ANNEALING POTS AND BOXES—
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.

ARMORING EQUIPMENT—
American Insulating Machy. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc, Worcester, Mass.
Synero Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Machy., Inc., Pawtucket, R. I.

BAKERS—Rod and Wire
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Morgan Construction Co., Worcester, Mass.
Ross, J. O., Engr. Corp., New York, N. Y.

BAR STOCK—Stainless Steel
American Steel & Wire Company, Cleveland, Chicago, New York.
Columbia Steel Co., San Francisco, Calif.
U. S. Steel Export Company, New York, N. Y.

BASKETS—Pickling
Rolock, Inc., Fairfield, Conn.

BOBBINS—Braider & Wire Weaving
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

BORAX—Wire Drawing
Pacific Coast Borax Corp., New York, N. Y.

BORON CARBIDE—
Norton Co., Worcester, Mass.

BRAKES—Pneumatic
Entwistle, Jas. L. Co., Pawtucket, R. I.

CABLE—Aluminum
Aluminum Co. of America, Pittsburgh, Pa.

CABLE LACQUERING OVENS—
Industrial Ovens, Inc., Cleveland, O.

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

CASTINGS—Wire Mill
Scudder, E. J., Fdry. & Mach. Co., Trenton, N.J.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CHEMICALS—Cleaning
(See Cleaners—Metal)

CLEANERS—Metal
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Phila., Pa.
Houghton, E. F., & Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Magnuson Products Corp., Brooklyn, N. Y.
Metal & Thermit Corp., New York, N. Y.
Oakite Products, Inc., New York, N. Y.
The Parkin Chemical Company, Pittsburgh, Pa.
Standard Industrial Compounds Co., Inc., Chicago, Ill.

CLEANING & PICKLING EQUIP.—
Cleveland Tramrail Div., of the Cleveland Crane & Engineering Co., Wickliffe, O.
Haveg Corp., Newark, Del.
Holden, A. F., Company, The, New Haven, Conn. and Detroit, Mich.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

CLOTH—WIRE, All Metals
Roebling's, John A. Sons, Co., Trenton, N. J.
Wickwire Bros., Cortland, N. Y.
Wickwire-Spencer Steel Division of Colorado Fuel & Iron Corp., Buffalo, N. Y.

COATING COMPOUNDS—
Apex Alkali Products Co., Philadelphia, Pa.
Houghton, E. F. & Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Inc., Chicago, Ill.

COILERS—Sheet, Strip and Wire
Entwistle, Jas. L. Co., Pawtucket, R. I.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J. Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Corp., Cleveland, Ohio.

COLD HEADERS—
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

COMPOUNDS—Coppering
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Diamond
Eastern Carbide Corp., New Rochelle, N. Y.
Hyprez Division, Engis Equipment Co., Chicago, Ill.
Magnus Chemical Co., Garwood, N. J.

COMPOUNDS—Metal Finishing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Metal & Thermit Corp., New York, N. Y.

COMPOUNDS—Rust Preventing
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corp., Lawrence, Mass.
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Oakite Products, Inc., New York, N. Y.

COMPOUNDS—Rust Removing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Houghton, E. F. & Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Inc., Chicago, Ill.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Houghton, E. F. & Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H. Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Pacific Coast Borax Corp., New York, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Inc., Chicago, Ill.
Swift & Company, Chicago, Ill.

CONDUCTORS—Flexible, Electrical
Montgomery Co., The, Windsor Locks, Conn.

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

CORDS—Electrical, Tinsel Conductor
Montgomery Co., The, Windsor Locks, Conn.

CORROSION PREVENTIVES—
Angier Corporation, The, Framingham, Mass.

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Adamas, Carbide Corporation, Harrison, N. J.
Carboloy Co., Inc., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Metal Carbides Corporation, Youngstown, Ohio.
Rusch Wire Die Corp., Croton-on-the-Hudson, New York.
Vascoloy-Ramet Corp., North Chicago, Ill.

DIAMONDS—Industrial
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Champion Diamond Co., New York, N. Y.
Diamond Distributors, Inc., New York, N. Y.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDERS—
Champion Diamond Co., New York, N. Y.
Diamond Distributors, Inc., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Hyprez Division, Engis Equipment Co., Chicago, Ill.
Indiana Wire Die Co., Ft. Wayne, Ind.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND TOOLS—
Carboloy Co., Inc., Detroit, Mich.
Champion Diamond Co., New York, N. Y.
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Carbide
(See Dies—Tungsten Carbide)

DIES—Cold Heading
Adamas, Carbide Corporation, Harrison, N. J.
Carboloy Co., Inc., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio.
Vascoloy-Ramet Corp., No. Chicago, Ill.

DIES—Diamond
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Champion Diamond Co., New York, N. Y.
Cochaud Wire Die Corp., New York, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Extrusion
Adamas, Carbide Corporation, Harrison, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
Hartley Tool & Die Co., Thomaston, Conn.
Metal Carbides Corporation, Youngstown, Ohio.
Robertson, John, Co., Brooklyn, N. Y.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Eyelet
Hartley Tool & Die Co., Thomaston, Conn.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.

DIES—Pointing
Sjogren Tool and Machine Co., Auburn, Mass.

DIES—Repairs & Re-Cutting
Adamas, Carbide Corporation, Harrison, N. J.
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Carboloy Co., Detroit, Mich.
Champion Diamond Co., New York, N. Y.
Cochaud Wire Die Corp., New York, N. Y.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Hartley Tool & Die Co., Thomaston, Conn.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Wayne Wire Die Co., Hillside, N. J.

DIES—Special Shapes, Etc.
Adamas, Carbide Corporation, Harrison, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Hartley Tool & Die Co., Thomaston, Conn.
Indiana Wire Die Co., Ft. Wayne, Ind.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.

DIES—Swaging
Fenn Manufacturing Co., Hartford, Conn.
Sjogren Tool & Machine Co., Inc., Auburn, Mass.

DIES—Tantalum Carbide
Adamas, Carbide Corporation, Harrison, N. J.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.

WHERE TO BUY, Continued

DIES—Tube Drawing
Adamas, Carbide Corporation, Harrison, N. J.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Hartley Tool & Die Co., Thomaston, Conn.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.

DIES—Tungsten Carbide
Adamas, Carbide Corporation, Harrison, N. J.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Hartley Tool & Die. Co., Thomaston, Conn.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Wayne Wire Die Co., Hillside, N. J.

DRAW BENCHES—
(See MACHINERY—Draw Benches)

DRUMS—Flange Steel
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.
Watson Machine Co., The, Paterson, N. J.

DRYING EQUIPMENT—
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Industrial Ovens, Inc., Cleveland, Ohio.
Ross, J. O., Engineering Corp., New York, N. Y.

ENGINEERS—Consulting
Wire Mill—Fisher, Edward J. P., North Jackson, Ohio
Lewis, Kenneth B.
Galvanizing—Imhoff, Wallace G. Co., The, Los Angeles, Calif.
Spring Design—Carlson Co., The, New York, N. Y.
Wire Cloth—Wickwire, T. H., Jr., Philadelphia, Pa.
Metal Fatigue—Fatigue of Materials Laboratory, Princeton, N. J.

EQUIPMENT—Insulation Testing
Davis, R. L., Elec. Co., Wallingford, Conn.
Entwistle, James L., Co., Pawtucket, R. I.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FENCING & FENCES—Wire
Interlocking Fence Co., Morton, Ill.

FLUXES—Soldering
American Chemical Paint Co., Ambler, Pa.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin Chemical Company, The, Pittsburgh, Pa.

FRICTION PAY-OFF STANDS—
Industrial Ovens, Inc., Cleveland, Ohio.

FURNACES—Annealing
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Niagara Falls, N. Y.
Holden, A. F., Co., The, New Haven, Conn. and Detroit, Mich.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engr. Co., Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Automatic
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Brazing
Electric Furnace Co., Salem, Ohio.
Rockwell, W. S., Co., Fairfield, Conn.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Niagara Falls, N. Y.
Michigan Oven Co., Detroit, Mich.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Electric
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Niagara Falls, N. Y.
Rockwell, W. S., Co., Fairfield, Conn.
Trauwood Engineering Co., The, Cleveland, Ohio.

FURNACES—Galvanizing Equipment
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio.
Holden, A. F., Co., The, New Haven, Conn, and Detroit, Mich.
Rockwell, W. S. Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engineering Co., The, Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Hard'ing & Temp'ing
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Niagara Falls, N. Y.
Holden, A. F., Co., The, New Haven, Conn, and Detroit, Mich.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engineering Co., The, Cleveland, Ohio

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio.
Robertson, John, Co., Brooklyn, N. Y.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Non-Oxidizing
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Holden, A. F., Co., The, New Haven, Conn, and Detroit, Mich.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Normalizing
Ajax Electric Co., Inc., Philadelphia, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Niagara Falls, N. Y.
Holden, A. F., Co., The, New Haven, Conn, and Detroit, Mich.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Pot (oil, gas, electric)
Ajax Electric Co., Inc., Philadelphia, Pa.
Holden, A. F., Co., The, New Haven, Conn, and Detroit, Mich.

FURNACES—Resistance Heating, Strand
Trauwood Engineering Co., The, Cleveland, Ohio.

FURNACES—Salt Bath
Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio.
Holden, A. F., Co., The, New Haven, Conn, and Detroit, Mich.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio.
Eisler Engineering Co., Newark, N. J.
Electric Furnace Co., Salem, Ohio.
Harper Electric Furnace Corp., Niagara Falls, N. Y.
Michigan Oven Co., Detroit, Mich.
Rockwell, W. S., Co., Fairfield, Conn.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engineering Co., The, Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

GALVANIZING EQUIPMENT—
Steel Equipment Co., Cleveland, Ohio.
Wean Equipment Corp., Cleveland, Ohio.

GRINDERS—Roll
Norton Co., The, Worcester, Mass.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HOOKS—Pickling & Liming
Rolock, Inc., Fairfield, Conn.
Youngstown Welding & Engineering Co., Youngstown, Ohio.

HOISTS—Electric Travelling
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Rolock, Inc., Fairfield, Conn.

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin Chemical Company, The, Pittsburgh, Pa.

INSULATING LACQUERING SYSTEMS—Continuous
American Insulating Machine Co., Phila., Pa.
Industrial Ovens, Inc., Cleveland, Ohio.

INSULATING MATERIALS—
Belding, Heminway, Corticelli Co., New York, N. Y.
Owens Corning Fiberglas Corp., Toledo, O.
Standard Varnish Works, Staten Island, N. Y.
Twitchell, E. W., Philadelphia, Pa.

INSULATING MATERIALS—Paper — For Electric Wire Cable.
Twitchell, E. W., Philadelphia, Pa.

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LATHES—Die Reaming
Carboloy Co., Inc., Detroit, Mich.
Roos, Tool & Mfg. Co., Montclair, N. J.

LIME—
Warner Co., Philadelphia and Bellefonte, Pa.

LININGS—Acid and Alkali Proof
Haveg Corp., Newark, Del.

LOOMS—Weaving Wire Cloth
Bruckner-Mitchell, Inc., New York, N. Y.

LUBRICANTS — For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Inc., Chicago, Ill.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Swift & Co., Chicago, Ill.

LUMBER—Wire Mill, for lagging and car blocking
North Anson Reel Co., North Anson, Maine.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Barbed Wire
Glader Machine Works, Chicago, Ill.
Wean Engineering Co., Cleveland, Ohio.

MACHINERY—Bead Wrapping
Terkelsen Machine Co., Boston, Mass.

MACHINERY—Braiding
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc., Pawtucket, R. I.

MACHINERY—Brazing
Eisler Engineering Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Bunching
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Bundling, Scrap
Fenn Manufacturing Co., Hartford, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Nilson, A. H. Machine Co., The, Bridgeport, Conn.

MACHINERY—Cable, Rope Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

WHERE TO BUY, Continued

MACHINERY—Coilers
Boyd & Sons Manufacturing Co., Phila., Pa.
Eisler Engineering Co., Newark, N. J.
Entwistle, Jas. L. Co., Pawtucket, R. I.
Fenn Manufacturing Co., Hartford, Conn.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (used), New York, N. Y.
New England Butt Co., Providence, R. I.
Ruesch, H. J. Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio.
Wire & Textile Machinery, Inc., Pawtucket, R. I.

MACHINERY—Cold Heading
(See Cold Headers)

MACHINERY—Copper Wire Drawing and Rolling
Aetna-Standard Engineering Co., Youngstown, Ohio.
American Insulating Mach'y Co., Phila., Pa.
Fenn Manufacturing Co., Hartford, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Ruesch, H. J. Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire
American Insulating Mach'y Co., Phila., Pa.
National Erie Corp., Erie, Pa.
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Standard Machinery Co., Mystic, Conn.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cutting
Eisler Engineering Co., Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio.
Mettler Machine Tool, Inc., New Haven, Conn.
National Mach'y Exch. (Used) New York, N. Y.
Nilson Machine Co., A. H., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Die Making
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Roos, Tool & Mfg. Co., Montclair, N. J.
Wayne Wire Die Co., Hillside, N. J.
Wickman, A. C., Ltd., Coventry, England.

MACHINERY—Draw Benches
Aetna-Standard Engineering Co., Youngstown, Ohio.
Fenn Manufacturing Co., Hartford, Conn.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Edging
Fenn Manufacturing Co., Hartford, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Industrial Ovens, Inc., Cleveland, Ohio.
Michigan Oven Co., Detroit, Mich.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Extruding
National Erie Co., Erie, Pa.
National Rubber Machinery Co., Akron, Ohio.
Robertson, John, Co., Brooklyn, N. Y.
Royle, John, & Sons, Paterson, N. J.
Standard Machinery Co., Mystic, Conn.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Fence
Blashill, Arthur, Woodstock, Ont., Canada.
Glader, Wm., Machine Works, Chicago, Ill.
Interlocking Fence Co., Morton, Ill.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Filament Coil Winding
Eisler Engineering Co., Newark, N. J.

MACHINERY—Flat Wire
Fenn Manufacturing Co., Hartford, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Galvanizing
(See Galvanizing Equipment)

MACHINERY—Galvanizing Wire
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

MACHINERY—Gang Winders
Entwistle, Jas. L. Co., Pawtucket, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Insulating
American Insulating Mach'y Co., Phila., Pa.
National Erie Co., Erie, Pa.
National Rubber Machinery Co., Akron, Ohio.
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lead Encasing Presses, etc.
Robertson, John Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
Robertson, John Co., Brooklyn, N. Y.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving
Interlocking Fence Co., Morton, Ill.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
Fenn Manufacturing Co., Hartford, Conn.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Material Handling
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MACHINERY—Measuring Wire & Cable
Durant Mfg. Co., Milwaukee, Wis.
Entwistle, Jas. L. Co., Pawtucket, R. I.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N.Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Panning
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Pickling
Rolock, Inc., Fairfield, Conn.

MACHINERY—Pointing
Aetna-Standard Engineering Co., Youngstown, Ohio.
Fenn Manufacturing Co., Hartford, Conn.
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N.Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry & Mach. Co., Trenton, N.J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Poultry Wire Fencing
Interlocking Fence Co., Morton, Ill.

MACHINERY—Rod Mill
Fenn Manufacturing Co., Hartford, Conn.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Rolling Mill
Fenn Manufacturing Co., Hartford, Conn.
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N.Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Rubber Insulating
Royle, John & Sons, Paterson, N. J.
Standard Machinery Co., Mystic, Conn.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Rubber Tubing and Straining
New England Butt Co., Providence, R. I.
Royle, John & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Mystic, Conn.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Screw Wire
National Mach'y Exch. (Used), New York, N.Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila., Pa.
Davis, R. L. Electric Co., Wallingford, Conn.
Emory, Robert J., Co., Newark, N. J.
Entwistle, Jas. L. Co., Pawtucket, R. I.
Fenn Manufacturing Co., Hartford, Conn.
New England Butt Co., Providence, R. I.
Ruesch, H. J. Machine Co., Newark, N. J.
Scudder, E. J., Fdry & Mach. Co., Trenton, N.J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Mystic, Conn.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Spooling
American Insulating Mach'y Co., Phila., Pa.
Boyd & Sons Manufacturing Co., Phila., Pa.
Bruckner-Mitchell, Inc., New York, N. Y.
Davis, R. L. Electric Co., Wallingford, Conn.
Eisler Engineering Co., Newark, N. J.
Emory, Robert J., Co., Newark, N. J.
Entwistle, Jas. L. Co., Pawtucket, R. I.
National Mach'y Exch. (Used), New York, N.Y.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.
Wean Equipment Corp., Cleveland, Ohio.
Wire & Textile Mach'y, Inc., Pawtucket, R. I.

MACHINERY—Spring Making
National Mach'y Exch. (Used), New York, N.Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Lewis Machine Co., The, Cleveland, Ohio.
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N.Y.
Nilson, A. H. Machine Co., Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Stranding
Hughesville Machine & Tool Co., Hughesville, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Forming
Wickman, A. C., Ltd., Coventry, England.

MACHINERY—Strip Steel
Aetna-Standard Engineering Co., Youngstown, Ohio.
Fenn Manufacturing Co., Hartford, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Steel Equipment Co., Cleveland, Ohio.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Swaging
Fenn Manufacturing Co., Hartford, Conn.
National Erie Corp., Erie, Pa.
National Mach'y Exch. (Used), New York, N.Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

WHERE TO BUY, Continued

MACHINERY—Testing Physical
Scott Testers, Inc., Providence, R. I.

MACHINERY—Testing Equipment—Sparkers
Davis, R. L. Elec. Co., Wallingford, Conn.
Entwistle, Jas. L., Pawtucket, R. I.
Wire & Textile Machinery, Inc., Pawtucket, R.I.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Steel Equipment Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.
Wean Equipment Co., Cleveland, Ohio.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.
Fenn Manufacturing Co., Hartford, Conn.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Marshall-Richards Machine Company, Ltd., Trenton, N. J.

MACHINERY—Weaving Wire Cloth
Bruckner-Mitchell, Inc., New York, N. Y.

MACHINERY—Welding Wire
Eisler Engineering Co., Newark, N. J.
Micro Products Co., Chicago, Ill.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
Bruckner-Mitchell, Inc., New York, N. Y.
Davis, R. L. Electric Co., Wallingford, Conn.
Eisler Engineering Co., Newark, N. J.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wind-up (Constant Tension, Variable Speed)
Aetna-Standard Engineering Co., Youngstown, Ohio.
Davis, R. L. Electric Co., Wallingford, Conn.
Fenn Manufacturing Co., Hartford, Conn.
Industrial Ovens, Inc., Cleveland, Ohio.
Marshall-Richards Machine Company, Ltd., Trenton, N. J.
Standard Machinery Co., Mystic, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Bending
Eisler Engineering Co., Newark, N. J.
Kilmer, M. D., & Co., Cleveland, Ohio.

MACHINERY—Wire Drawing
Aetna-Standard Engineering Co., Youngstown, Ohio.
American Insulating Mach'y Co., Phila., Pa.
Fenn Manufacturing Co., Hartford, Conn.
Marshall-Richards Machine Company, Ltd., Trenton, N. J.
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N.Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry & Mach. Co., Trenton, N.J.
Sleeper & Hartley, Inc., Worcester, Mass.
Steel Equipment Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Wean Equipment Corp., Cleveland, Ohio.

MACHINERY—Wire Forming
Fenn Manufacturing Co., Hartford, Conn.
Kilmer, M. D. & Co., Cleveland, Ohio.
National Mach'y Exch. (Used), New York, N.Y.
Nilson Machine Co., A. H., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Wickman, A. C., Ltd., Coventry, England.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wood Screw
National Mach'y Exch. (Used), New York, N.Y.

MACHINERY—Wrapping Straight Lengths and Tubing
Angier Corporation, The, Framingham, Mass.
Terkelsen Machine Co., Boston, Mass.

MACHINERY—Wrapping Wire Coils
Angier Corporation, The, Framingham, Mass.
Terkelsen Machine Co., Boston, Mass.

MATERIAL HANDLING EQUIPMENT
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MILLS—Tandem, Rolling & Edging
Torrington Mfg. Co., Torrington, Conn.
Wean Equipment Co., Cleveland, Ohio.

NAILS—Wire
American Steel & Wire Co., Cleveland, Chicago, New York.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling, John A. Sons Co., Trenton, N. J.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire-Spencer Steel Division of Colorado Fuel & Iron Corp., Buffalo, N. Y.

OVENS—Cable Lacquering
American Insulating Mach'y Co., Phila., Pa.
Industrial Ovens, Inc., Cleveland, Ohio.
Michigan Oven Co., Detroit, Mich.

OVENS—Dehydrogenizing
Carl-Mayer Corp., The, Cleveland, Ohio.
Industrial Ovens, Inc., Cleveland, Ohio.

OVENS—Industrial
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Industrial Ovens, Inc., Cleveland, Ohio.
Michigan Oven Co., Detroit, Mich.
Ross, J. O., Engr. Corp., New York, N. Y.

OVENS—Rod Bakers
Michigan Oven Co., Detroit, Mich.

OVENS—Welding Rod Coating
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Industrial Ovens, Inc., Cleveland, Ohio.
Ross, J. O., Engr. Corp., New York, N. Y.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Angier Corporation, The, Framingham, Mass.
Crepe-Kraft Company, The, Division National Waterproof Papers, Inc., Newark, N. J.
Terkelsen Machine Co., Boston, Mass.

PAPER—For Coil Wrapping and Corrosion Prevention
Angier Corporation, The, Framingham, Mass.
Crepe-Kraft Company, The, Division National Waterproof Papers, Inc., Newark, N. J.
Terkelsen Machine Co., Boston, Mass.

PATENT ATTORNEYS—
Lancaster, Allwine & Rommel, Washington, D.C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin Chemical Co., The, Pittsburgh, Pa.

PICKLING—Hooks, etc. Acid Resisting
Rolock, Inc., Fairfield, Conn.
Youngstown Welding & Engineering Co., Youngstown, Ohio.

PICKLING TANK LININGS—
Haveg Corp., Newark, Del.

PLASTIC TESTERS—
Scott Testers, Inc., Providence, R. I.

PNEUMATIC CYLINDERS—
Entwistle, James L. Co., Pawtucket, R. I.

POTS—Lacquer
Industrial Ovens, Inc., Cleveland, Ohio.

POTS—Lead Melting
Robertson, John, Co., Brooklyn, N. Y.

PRESSES—Hydraulic and Mechanical
Robertson, John, Co., Brooklyn, N. Y.
Standard Machinery Co., Mystic, Conn.

PRESSES—Lead
Robertson, John, Co., Brooklyn, N. Y.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry & Mach. Co., Trenton, N.J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wean Equipment Corp., Cleveland, Ohio.

PUMPS—Hydraulic
Robertson, John, Co., Brooklyn, N. Y.

REEL AND TENSION STANDS—
Davis, R. L. Electric Co., Wallingford, Conn.
Entwistle, James L., Co., Pawtucket, R. I.
Industrial Ovens, Inc., Cleveland, Ohio.
Roll-a-Reel, Cincinnati, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Roll-a-Reel, Cincinnati, Ohio
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Drawn Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Co., Chicago, Ill.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp. Niles, Ohio.

REELS & SPOOLS—Collapsible
Entwistle, Jas. L. Co., Pawtucket, R. I.

REELS & SPOOLS—Plastic
Hubbard Spool Co., Chicago, Ill.

REELS & SPOOLS—Steel
American Pulley Company, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Co., Chicago, Ill.
Mason Can Company, Providence, R. I.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

REELS AND SPOOLS—Shipping and Shop
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Clark, J. L., Mfg., Co., Rockford, Ill.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Co., Chicago, Ill.
Mason Can Company, Providence, R. I.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.
North Anson Reel Co., North Anson, Maine.

REELS & SPOOLS—Wooden
Acrometal Products, Inc., Minneapolis, Minn.
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., Inc., The, Hazardville, Conn.
Durkee Mfg. Co., Pine River, Minn.
North Anson Reel Co., North Anson, Maine.

REELS—Metal Bound
Durkee Mfg. Co., Pine River, Minn.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Co., Chicago, Ill.
North Anson Reel Co., North Anson, Maine.

REELS—Takeoff
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Clark, J. L. Mfg. Co., Rockford, Ill.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.
North Anson Reel Co., North Anson, Maine.

REELS—Vulcanizing & Impregnating
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

REELS—Wire Drawing
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

WHERE TO BUY, Continued

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg., Co., The, Hazardville, Conn.
Durkee Mfg. Co., Pine River, Minn.
Howsam Spool Co., Aurora, Ill.
Hubbard Spool Company, Chicago, Ill.
Mason Can Company, Providence, R. I.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.
North Anson Reel Co., North Anson, Maine.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

RESISTANCE HEATING—Annealing Patenting, Etc.
Trauwood Engr. Co., Cleveland, Ohio.

ROD BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio.
Drying Systems, Inc., Chicago, Ill.
Rockwell W. S., Co., Fairfield, Conn.
Ross, J. O., Engineering Corp., New York, N.Y.

RODS—Aluminum
Aluminum Co. of America, Pittsburgh, Pa.

RODS—Nickel Alloy
International Nickel Co., Inc., New York, N.Y.

RODS—Stainless Steel
American Steel & Wire Co., Cleveland, Ohio.

RODS—Wire—Non-Ferrous
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Wire, Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's John A., Sons Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

ROPE—Wire
American Steel & Wire Company, Cleveland, Chicago, New York.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Roebling's John A., Sons Co., Trenton, N. J.
U. S. Steel Export Co., New York, N. Y.
Wickwire-Spencer Steel Division of Colorado Fuel & Iron Corp., Buffalo, N. Y.

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott Testers, Inc., Providence, R. I.

RUST PROOF COMPOUNDS—
(See Compounds—Rust Preventing)

RUST REMOVING COMPOUNDS—
(See Compounds—Rust Preventing)

SALTS—Heat Treating, Descaling, etc.
Holden, A. F., Company, The, New Haven, Conn. and Detroit, Mich.

SATURATION SYSTEMS—
Industrial Ovens, Inc., Cleveland, Ohio.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc., Pawtucket, R. I.

SOAPS—Industrial and Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H. Co., Inc., Homer, N. Y.
Potter, Neil Co., Newark, N. J.
Standard Industrial Compounds Co., Inc., Chicago, Ill.
Swift & Company, Chicago, Ill.

SOLVENT RESIN SYSTEMS—Experimental
Industrial Ovens, Inc., Cleveland, Ohio.

STAMPINGS—Steel
Hubbard Spool Company, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Steel
Armco Steel Corp., The, Middletown, Ohio.
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Roebling's, John A., Sons Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Watson Machine Co., Paterson, N. J.

TANKS—Compound
Haveg Corp., Newark, Del.
Watson Machine Co., Paterson, N. J.

TANKS—Pickling
Haveg Corp., Newark, Del.

TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.

TINSEL—Cords, Decorative
(See: Tinsel—Electric Conductor)

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL—Electric Resistance
(See: Tinsel—Electric Conductor)

TINSEL—Lame, Silver and False Gold
(See: Tinsel—Electric Conductor)

TINSEL—Thread, Silver and False Gold
(See: Tinsel—Electric Conductor)

TINSEL—Thread, Decorative
(See: Tinsel—Electric Conductor)

TINSEL—Wire
(See: Tinsel—Electric Conductor)

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRAVERSES—For Reels
Entwistle, James L. Co., Pawtucket, R. I.
Hubbard Spool Company, Chicago, Ill.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.

TRAVERSE MECHANISMS—
Apco Mossberg Co., Attleboro, Mass.
Fenn Manufacturing Company, Hartford, Conn.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New Eng'land Butt Co., Providence, R. I.
Niles Steel Products Div., Republic Steel Corp., Niles, Ohio.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc., Pawtucket, R. I.

TUBE BENDERS AND FORMERS—
H. D. Kilmer Co., Cleveland, Ohio.
Ruesch, H. J., Machine Co., Newark, N. J.

TURKS HEADS—
Fenn Manufacturing Co., Hartford, Conn.

VALVES & FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

VARNISHES—For Insulation
Standard Varnish Works, Staten Island, N. Y.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WEAVING—Industrial Wire Cloth
Bruckner-Mitchell, Inc., New York, N. Y.

WELDERS—Spot and Butt
Eisler Engineering Co., Newark, N. J.
Micro Products Co., Chicago, Ill.

WIND-UP AND UNWIND SYSTEMS—Continuous
American Insulating Mach'y Co., Phila., Pa.
Davis R. L. Electric Co., Wallingford, Conn.
Entwistle, James L., Co., Pawtucket, R. I.
Industrial Ovens, Inc., Cleveland, Ohio.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc., Pawtucket, R. I.

WIRE—Aluminum
Aluminum Co. of America, Pittsburgh, Pa.
Malin & Co., Cleveland, Ohio.

WIRE—Barbed
Interlocking Fence Co., Morton, Ill.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Cold Heading
American Steel & Wire Co., Cleveland-Chicago, New York.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.
U. S. Steel Export Co., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Electric
Malin & Co., Cleveland, Ohio.

WIRE—Flat, Fine
Montgomery Co., The, Windsor Locks, Conn.

WIRE—Manufacturers
American Steel & Wire Co., Cleveland-Chicago, New York.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire-Spencer Steel Division of Colorado Fuel & Iron Corp., Buffalo, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Music
American Steel & Wire Co., Cleveland-Chicago, New York.
Columbia Steel Co., San Francisco, Calif.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., Cleveland, Ohio.
U. S. Steel Export Co., New York, N. Y.

WIRE—Nickel & Nickel Alloy
International Nickel Co., Inc., New York, N. Y.

WIRE—Nickel Silver and Phosphor Bronze
Malin & Co., Cleveland, Ohio.

WIRE—Spring
American Steel & Wire Co., Cleveland-Chicago, New York.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
U. S. Steel Export Co., New York, N. Y.
Wickwire-Spencer Steel Division of Colorado Fuel & Iron Corp., Buffalo, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
American Steel & Wire Co., Cleveland-Chicago, New York.
Columbia Steel Co., San Francisco, Calif.
Firth Sterling Steel & Carbide Co., McKeesport, Pa.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
U. S. Steel Export Co., New York, N. Y.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Keystone Steel & Wire Co., Peoria, Ill.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Straightening and Cutting
Pittsburgh Cut Wire Co., Pittsburgh, Pa.
Wickwire Brothers, Inc., Cortland, N. Y.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE CLOTH—Industrial
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire-Spencer Steel Division of Colorado Fuel & Iron Corp., Buffalo, N. Y.

WRAPPING PAPER—Creped
Angier Corporation, The, Framingham, Mass.
Crepe-Kraft Company, The, Division National Waterproof Papers, Inc., Newark, N. J.

YARNS & TAPES—
Belding, Heminway, Corticelli Co., New York, N. Y.
Owens Corning Fiberglas Corp., Toledo, Ohio.
Twitchell, E. W., Philadelphia, Pa.

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

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Open construction facilitates adjustments and reduces "down" time.

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Two-speed drives. Quiet phenolitic support rollers with rapid eccentric axle position adjustment. All anti-friction bearing. All steel spring-set air-off brakes. Rapid stops. Great variety of auxiliaries for complete machines.

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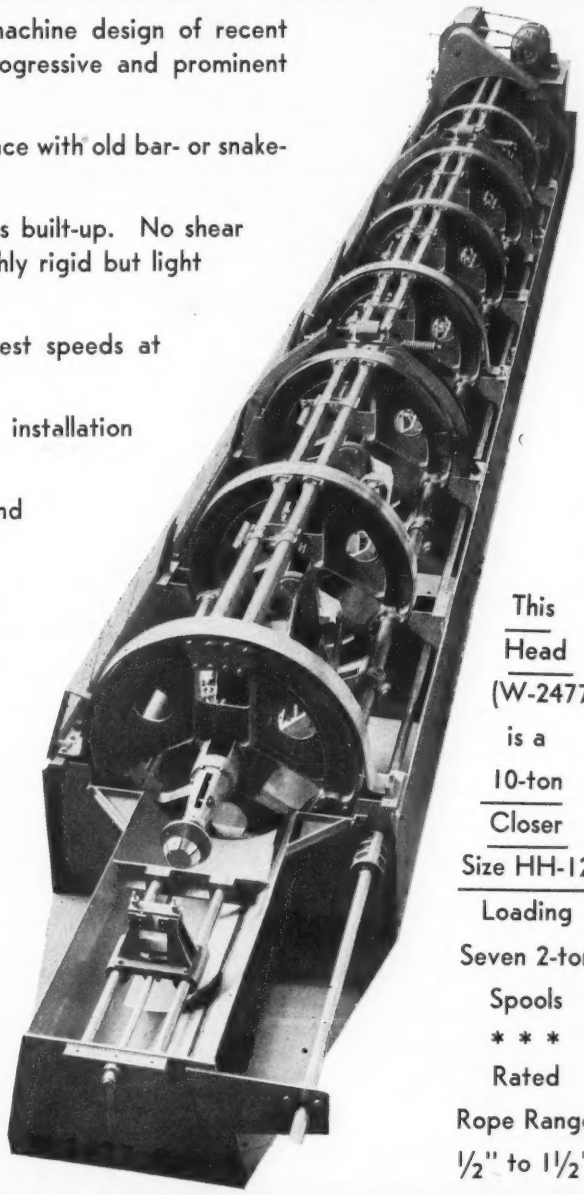
NOTE:

We have and can still furnish large tubular machines. However, in the large sizes there is no cost advantage and the obvious advantages of the "HH" designs do not permit us to recommend large tubular rotors for general purpose requirements.

Request additional details



This Head (W-2477) is a 10-ton Closer Size HH-12

Loading Seven 2-ton Spools

* * *

Rated Rope Range 1/2" to 1 1/2"

FOR WIRE ROPE MAKERS ATTENTION: An Eastern rope mill now concentrating on high speed stranding and closing will dispose of their planetary stranders, six machines, 7, 25 and 49 wire, 70 and 100 lb. spools, variable backturn. Complete machines with electricals. Some post war. Immediate delivery. Good condition. Available for inspection. First class U. S. makes. Very low prices to speed disposal.—INQUIRIES INVITED.

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EF furnaces are built for processing hot or cold rolled — high, medium, or low carbon — or stainless strip. Capacities from 1,000 to 28,000 lbs. or more per hour — single or multiple strands up to 54", or wider. More complete details and treated samples furnished promptly.

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